

UNIFORM STANDARD DETAILS

for

PUBLIC WORKS CONSTRUCTION

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**1998
ARIZONA**

(Includes Revisions Through 2005)

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DETAIL NO.

100-1



**STANDARD DETAIL
ENGLISH**

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DETAIL NO.

100-1

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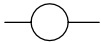






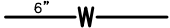

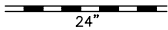



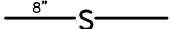
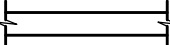

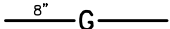






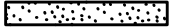









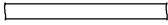



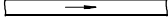

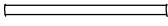
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- 550 SPILLWAY INLET AND OUTLET
- 552 CONCRETE CUT-OFF WALLS
- 555 EROSION PROTECTION/RIPRAP

1. THESE DETAILS HAVE BEEN PREPARED IN AN EFFORT TO STANDARDIZE THE CONSTRUCTION DETAILS USED BY VARIOUS CONTRACTING AGENCIES IN MARICOPA COUNTY. THEY ARE TO BE USED IN CONJUNCTION WITH THE CURRENT METRIC EDITION OF THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION" SPONSORED AND DISTRIBUTED BY THE MARICOPA ASSOCIATION OF GOVERNMENTS.
2. MANY NOTES WITHIN THESE DETAILS REFER TO VARIOUS SECTIONS OF THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION." WHERE THIS REFERENCE IS MADE, ONLY THE ABBREVIATION "SECT." IS USED. AN EXAMPLE OF THIS REFERENCE WOULD BE: "CLASS 'A' CONCRETE PER SECT. 725."
3. MANY NOTES WITHIN THESE DETAILS REFER TO OTHER DETAILS WITHIN THIS BOOK. WHERE THIS REFERENCE IS MADE, THE ABBREVIATION "DETAIL" IS USED. AN EXAMPLE OF THIS WOULD BE: "SEE DETAIL 391 FOR VALVE BOX INSTALLATION."
4. MANY DETAILS COVER MORE THAN ONE SHEET. THESE SHEETS HAVE BEEN GIVEN THE SAME NUMBER WITH A SUFFIX NUMBER, EXAMPLE: 391-1 AND 391-2.
5. AN EFFORT HAS BEEN MADE TO INCLUDE THE MOST COMMONLY USED CONSTRUCTION DETAILS IN THIS BOOK. ITEMS WHICH REQUIRE DESIGN CONSIDERATION BY THE DESIGNING ENGINEER HAVE NOT BEEN INCLUDED.
6. SOME OF THE DETAILS PRINTED HEREIN MAY BE USED BY SOME OF THE AGENCIES BUT NOT OTHERS. THE DESIGNING ENGINEER SHOULD THEREFORE CONTACT THE AGENCY WITHIN WHOSE JURISDICTION HE IS WORKING FOR DIRECTION AS TO WHICH DETAIL OR PORTIONS OF DETAILS SHOULD BE USED.
7. DETAIL DRAWINGS ARE NOT TO SCALE.

CONCRETE PVMT. SECTION		MANHOLE		SINGLE CURB	
SUBGRADE SEAL SECTION		SEWER CLEANOUT		MAIL BOX	
SELECT MATERIAL SECTION		RAILROAD		EXISTING WATER LINE	
AGGREGATE BASE SECTION		IRRIGATION LINE		EXISTING TELEPHONE LINE	
BITUMINOUS PVMT. SECTION		IRRIGATION STANDPIPE		EXISTING SEWER LINE	
EXISTING PAVEMENT		"L" HEADWALL		EXISTING GAS LINE	
OBLITERATE PAVEMENT		TELEPHONE OR TEL. LINE		EXISTING STORM DRAIN LINE	
CONCRETE PAVEMENT		POWER OR JOINT LINE		EXISTING IRRIGATION LINE	
BITUMINOUS PAVEMENT		DOWN GUY & ANCHOR			
		STREET LIGHT			
SECTION LINE		STREET SIGN			
ROADWAY CENTER LINE		TRAFFIC SIGN			
SURVEY MONUMENT		TRAFFIC SIGNAL LIGHT			
FIRE HYDRANT		SIDEWALK			
WATER METER		CURB & GUTTER			
WATER OR GAS VALVE		VALLEY GUTTER			
GAS METER		SINGLE GUTTER			

DETAIL NO.

110



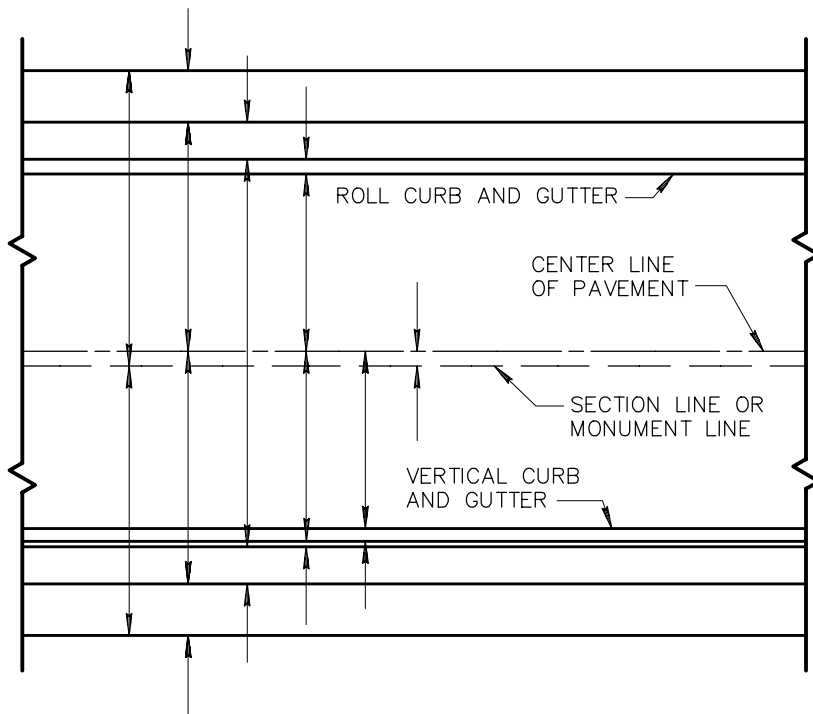
STANDARD DETAIL
ENGLISH

PLAN SYMBOLS

REVISED

DETAIL NO.

110



DIMENSION SHOULD BE GIVEN ONCE ON EACH SHEET AND SHOULD BE PLACED NEAR THE CENTER OF THE SHEET. IF ANY OF THE GIVEN CONDITIONS CHANGE, THEY SHOULD BE REDIMENSIONED AT THE POINT OF CHANGE.

GIVEN DIMENSIONS IN ORDER STARTING WITH THE LONGEST AND ENDING WITH THE SHORTEST, AS SHOWN IN THE SKETCH.

GIVE COMPLETE DIMENSIONS.

IF THE CENTERLINE OF PAVEMENT DOES NOT FALL ON THE SECTION LINE OR MONUMENT LINE OF THE STREET, DIMENSION AS ABOVE AND SHOW THE DIFFERENCE BETWEEN THE SECTION OR MONUMENT LINE AND THE CENTERLINE.

DETAIL NO.

112



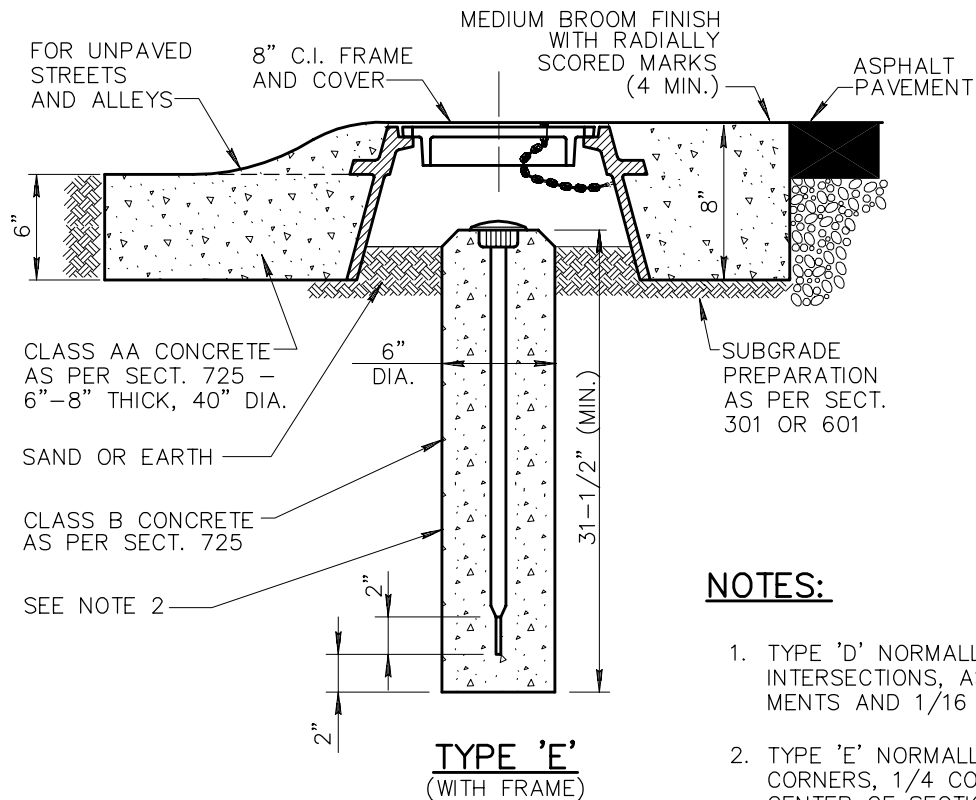
STANDARD DETAIL
ENGLISH

**DIMENSIONING
FOR ROAD IMPROVEMENT PLANS**

REVISED

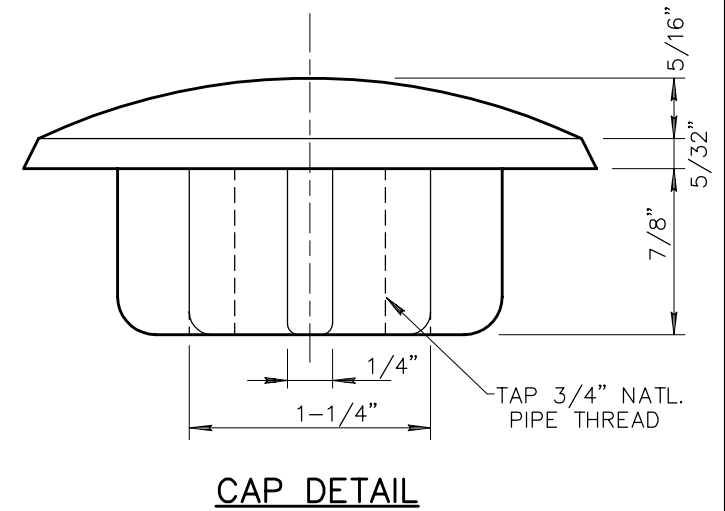
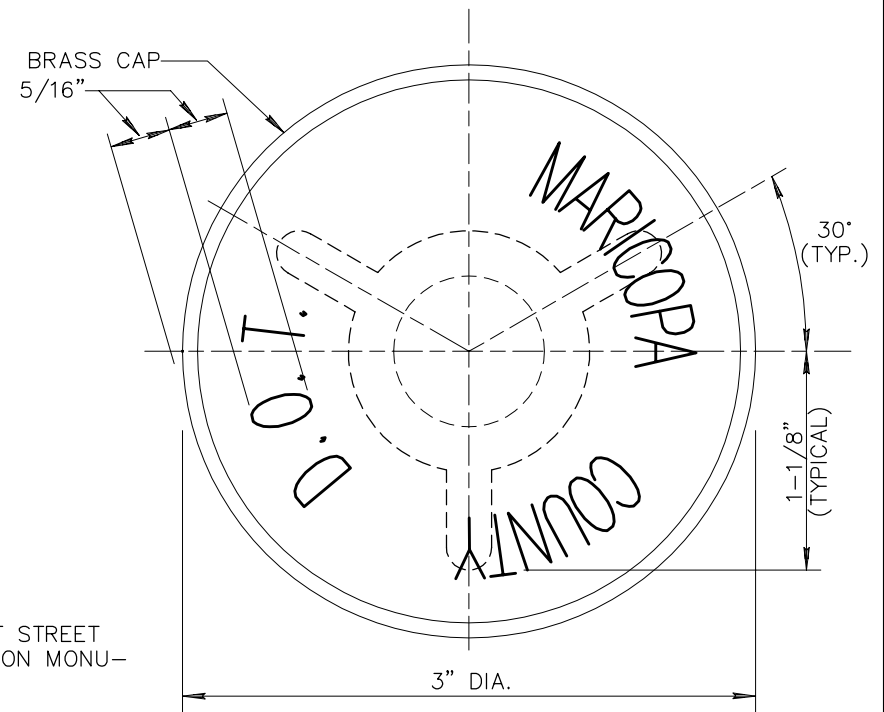
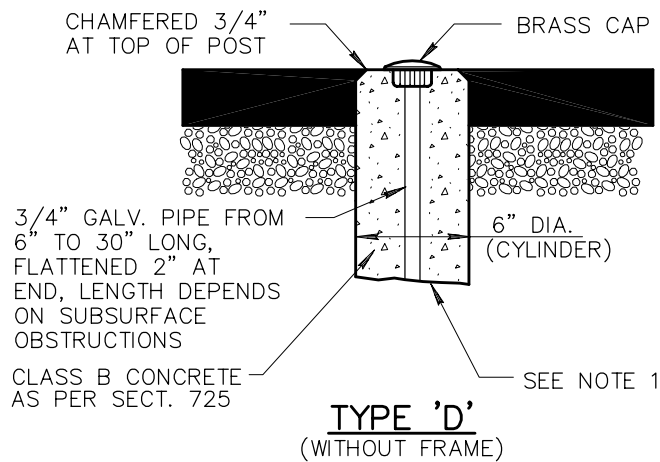
DETAIL NO.

112



NOTES:

1. TYPE 'D' NORMALLY USED AT STREET INTERSECTIONS, AS SUBDIVISION MONUMENTS AND 1/16 CORNERS.
2. TYPE 'E' NORMALLY USED ON SECTION CORNERS, 1/4 CORNERS AND AT THE CENTER OF SECTIONS. CONCRETE POST IS CHAMFERED 3/4" AT TOP. MINIMUM LENGTH OF POST 31-1/2". LENGTH DEPENDS ON SUBSURFACE OBSTRUCTIONS SUCH AS OLD CONCRETE PAVING, ROCK, ETC. 3/4" GALVANIZED PIPE SET IN THIS POST SHALL BE A MINIMUM OF 30" LONG EXCLUSIVE OF COUPLING, SEE PLANS.
3. CAP TO BE CONSTRUCTED OF RED BRASS OR BRONZE.
4. FRAME AND COVER TO INCLUDE CHAIN PER STD. DETAIL 270.



DETAIL NO.

120-2



STANDARD DETAIL
ENGLISH

SURVEY MARKER

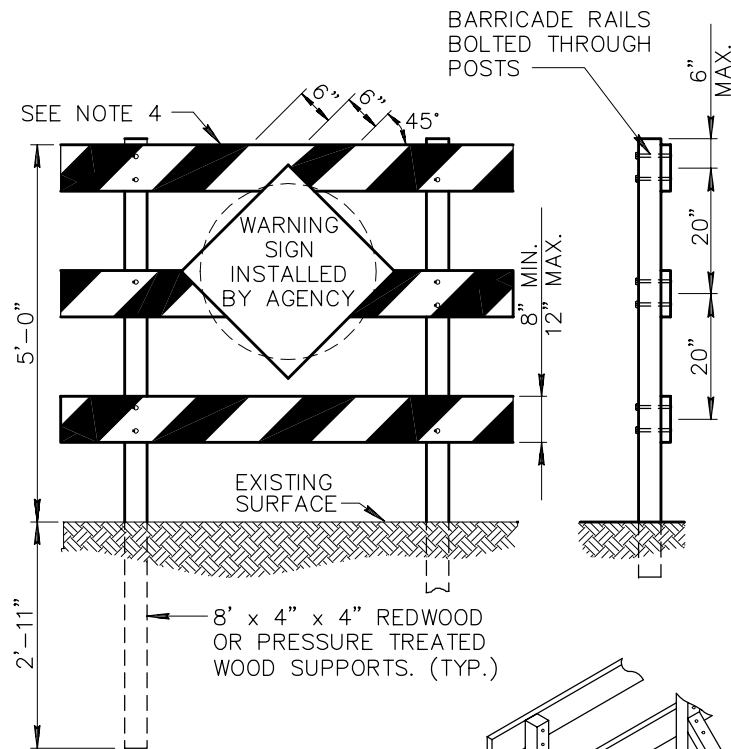
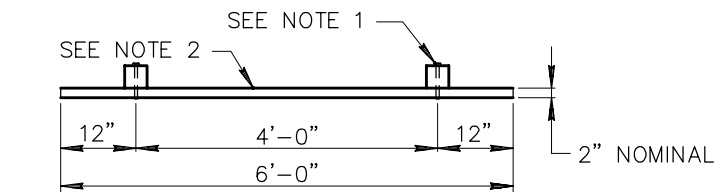
(FOR UNINCORPORATED AREAS OF COUNTY)

REVISED

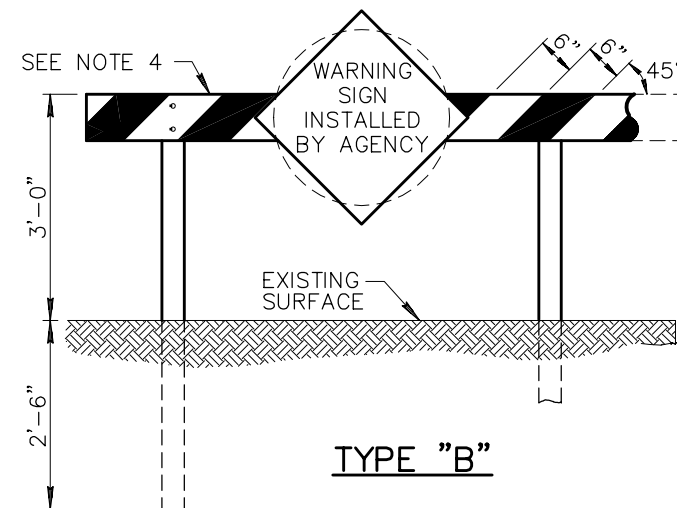
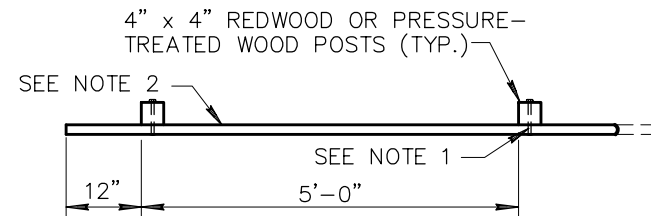
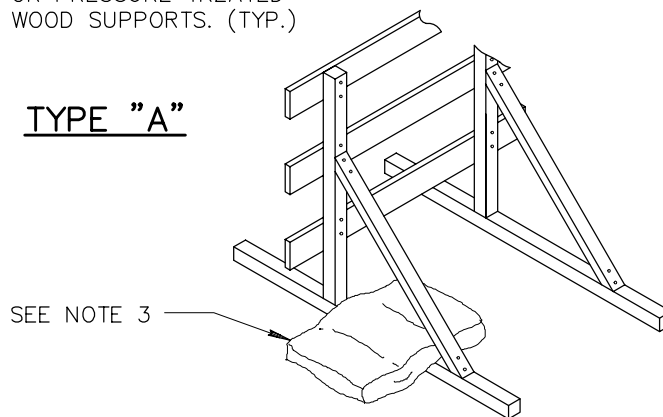
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DETAIL NO.

120-2



TYPE "A"



TYPE "B"

NOTES:

1. FASTEN WITH 1/2" x 5" LAG SCREWS WITH 2 FLAT WASHERS OR (2) 5/8" BOLTS, WITH 4 FLAT WASHERS.
2. 2" x 8" DOUGLAS FIR PLANK (LENGTH TO BE DETERMINED ON PLANS.)
3. WHEN BARRICADE (TYPE "A") IS CONSTRUCTED ON BASES INSTEAD OF POSTS SET INTO THE GROUND, IT MAY BE DESIRABLE TO BALLAST THE BASES WITH SAND BAGS OR BY STAKING TO PROVIDE RESISTANCE TO OVERTURNING DURING PERIODS OF HIGH WINDS.
4. TWO COATS OF WHITE PAINT PER SECTION 790 SHALL BE APPLIED TO ALL EXPOSED SURFACES OF THE BARRICADE. AN ADDITIONAL TWO COATS OF ORANGE PAINT PER SECTION 790 SHALL BE APPLIED TO CREATE THE ALTERNATE ORANGE AND WHITE STRIPES FOR TEMPORARY BARRICADES AND TWO COATS OF RED PAINT PER SECTION 790 SHALL BE APPLIED TO CREATE ALTERNATE RED AND WHITE STRIPES FOR PERMANENT BARRICADES. HIGHWAY SAFETY SPHERES (BEADS) PER ADOT 708-2.02 SHALL BE APPLIED BY HAND TO ALL CROSS MEMBERS, FRONT AND BACK AND ON BOTH COLORS, IMMEDIATELY AFTER PAINTING. THE STRIPES SHALL SLOPE DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS.

DETAIL NO.

130



**STANDARD DETAIL
ENGLISH**

BARRICADES

REVISED

01-01-2003

DETAIL NO.

130

FLANGED STEEL 'U'
CHANNEL (2 LBS. OR 3 LBS.
PER SQUARE FOOT
AS SPECIFIED)

2-1/2" DIA. STANDARD
PIPE GALVANIZED OR
2-3/8" O.D. STANDARD
PIPE GALVANIZED
(AS SPECIFIED)

2" DIA.
STANDARD PIPE
GALVANIZED

NOTES

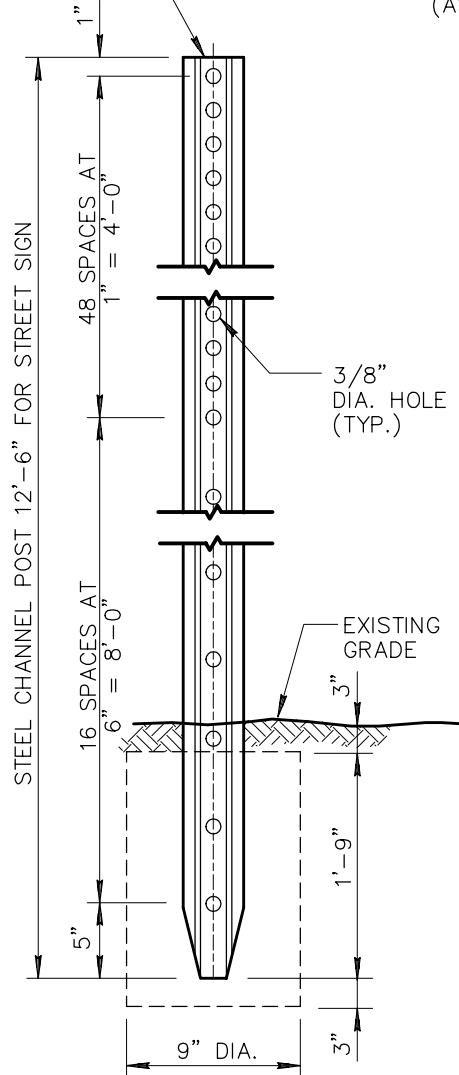
TYPE 'A'

USE DRIVING HEAD FOR DRIVING ALL
FLANGED STEEL 'U' CHANNEL POSTS.

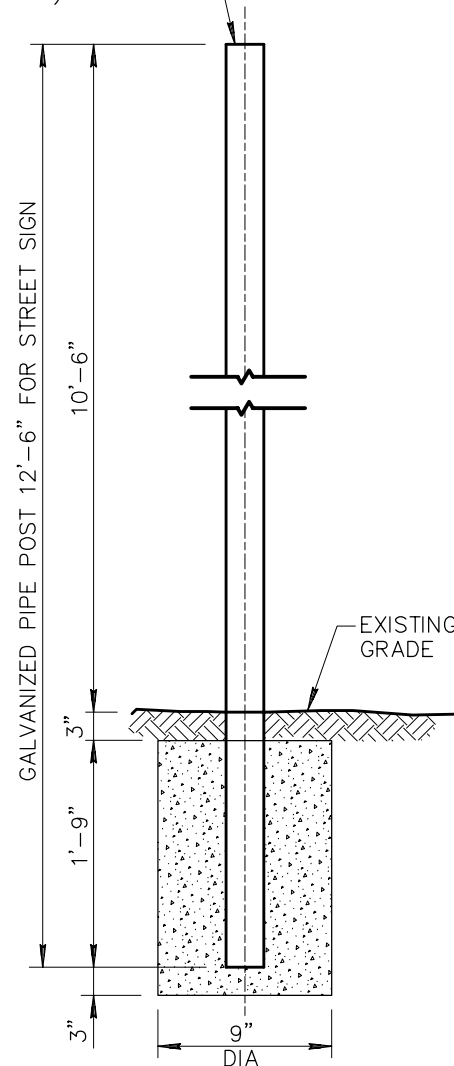
IN LIEU OF DRIVING FLANGED STEEL
'U' CHANNEL POSTS MAY BE SET IN
CONCRETE BASE FOUNDATION AS
PER TYPE 'B' BASE.

TYPE 'B' & TYPE 'C'

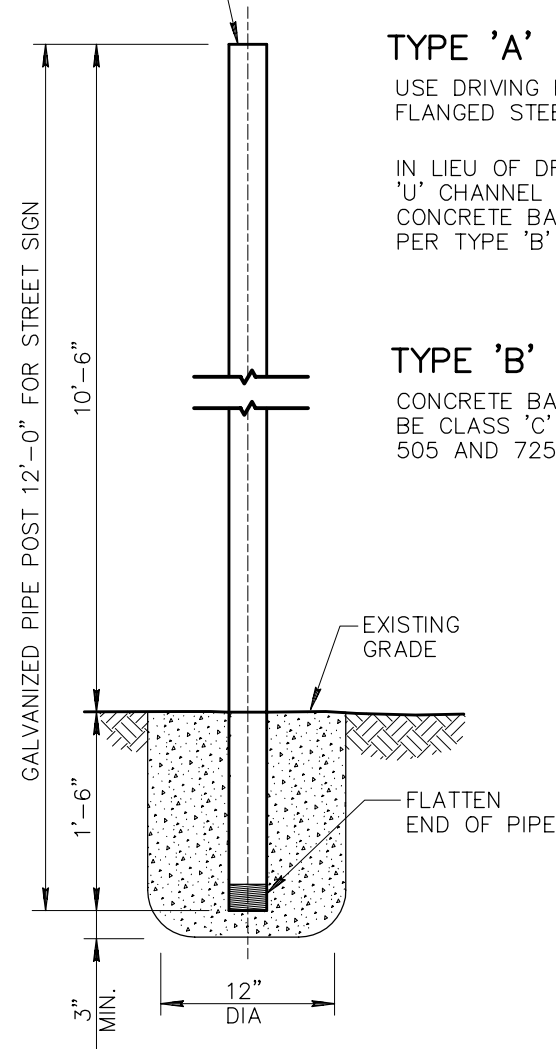
CONCRETE BASE FOUNDATIONS SHALL
BE CLASS 'C' CONCRETE AS PER SECT.
505 AND 725.



TYPE 'A'



TYPE 'B'



TYPE 'C'

DETAIL NO.

131



STANDARD DETAIL
ENGLISH

STREET SIGN BASE

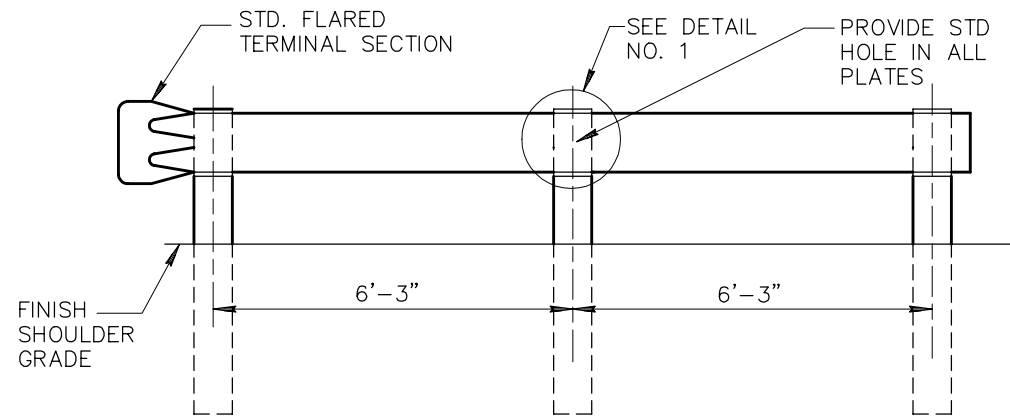
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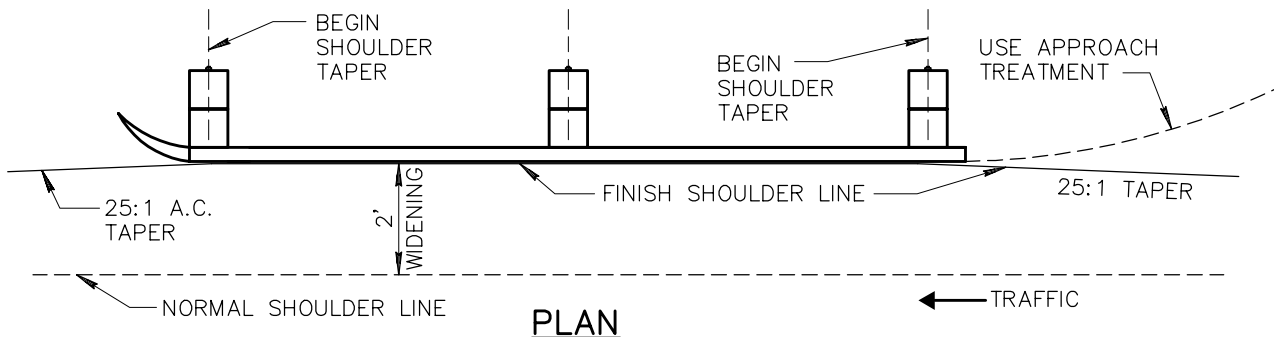
131

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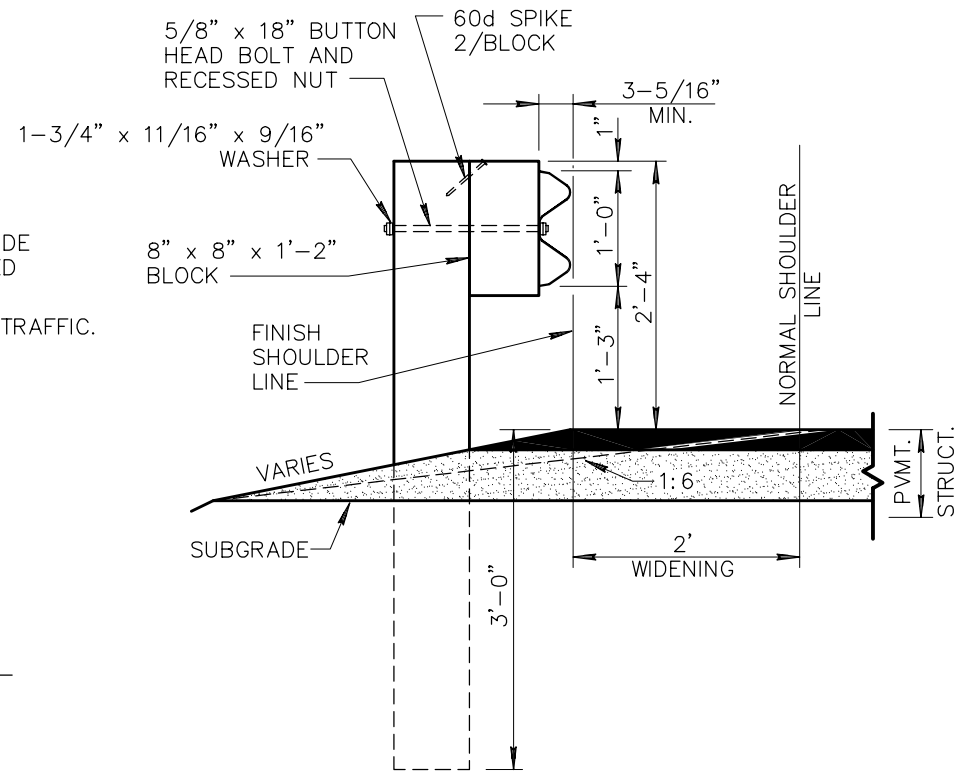
1. POSTS AND BLOCKS SHALL BE 8" x 8" ROUGH WOOD, PRESSURE TREATED AND UNPAINTED. HOLES SHALL BE BORED BEFORE TREATMENT. SEE SECT. 415
2. ALL GUARD RAIL PLATE, FITTINGS, HARDWARE, ETC. SHALL BE GALVANIZED.
3. TYPE 'A' GUARD RAIL INSTALLED ON NORMAL SHOULDER LINE.
4. TYPE 'B' GUARD RAIL INSTALLED ON WIDENED ROADWAY SHOULDER LINE.
5. TYPE 'B' INSTALLATION SHOWN. TYPE 'A' INSTALLATION SAME EXCEPT THAT INSIDE FACE OF GUARD RAIL SHALL FALL ON THE NORMAL SHOULDER LINE AS INDICATED BY PLAN DRAWING.
6. INSTALL LAP PLATES SO THAT EXPOSED EDGES ARE AWAY FROM APPROACHING TRAFFIC.



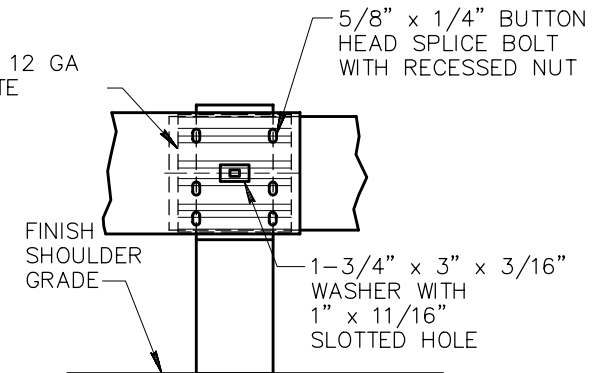
FACE ELEVATION



PLAN



SIDE ELEVATION



DETAIL NO. 1

DETAIL NO.

135-1



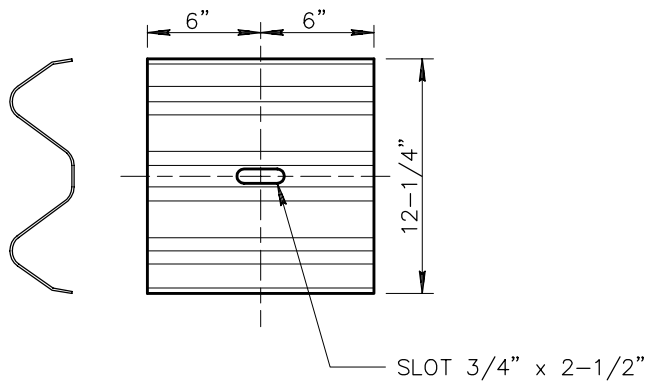
STANDARD DETAIL
ENGLISH

STEEL GUARD RAIL

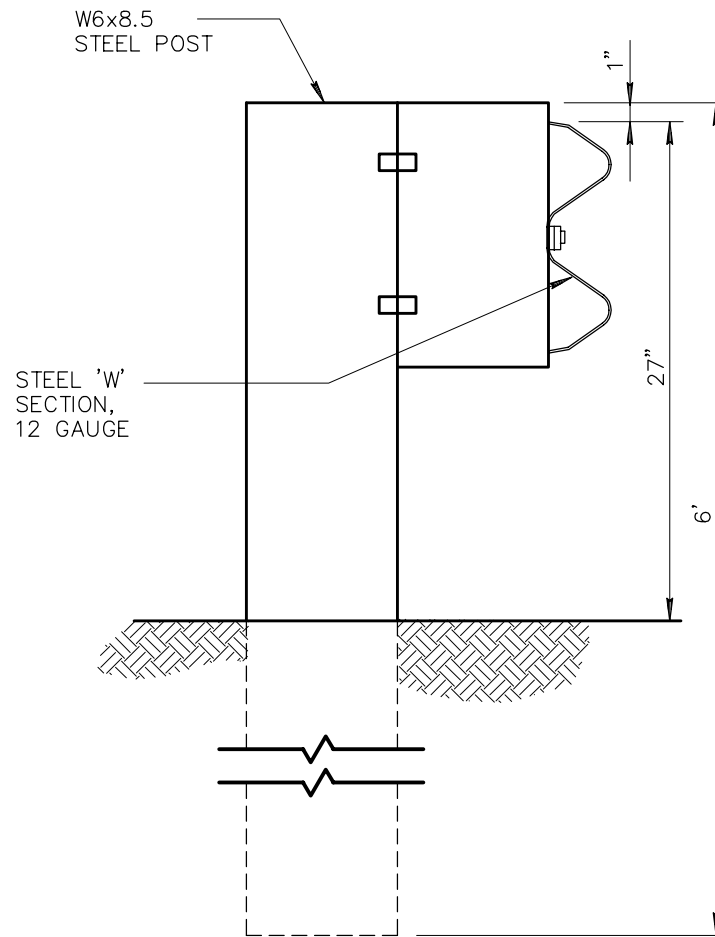
REVISED

DETAIL NO.

135-1



'W' SECTION BACK-UP PLATE
FOR STEEL POSTS



'W' BEAM (STEEL POST)

DETAIL NO.
135-2

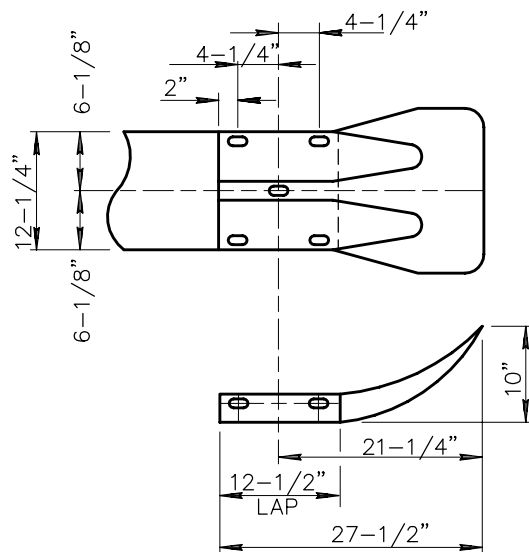


STANDARD DETAIL
ENGLISH

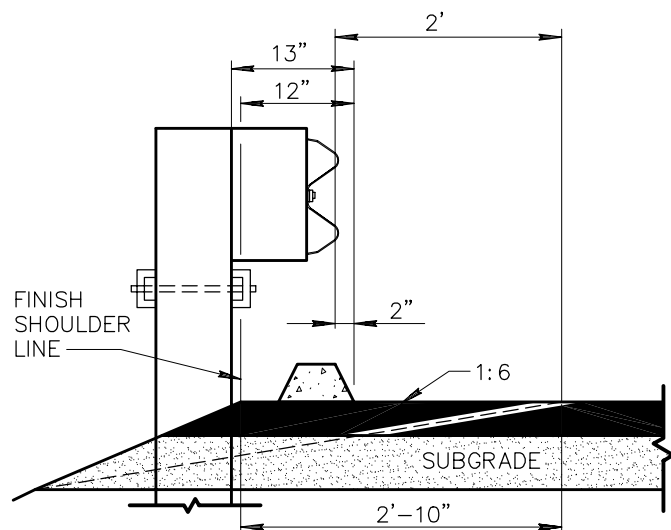
STEEL GUARD RAIL

REVISED

DETAIL NO.
135-2



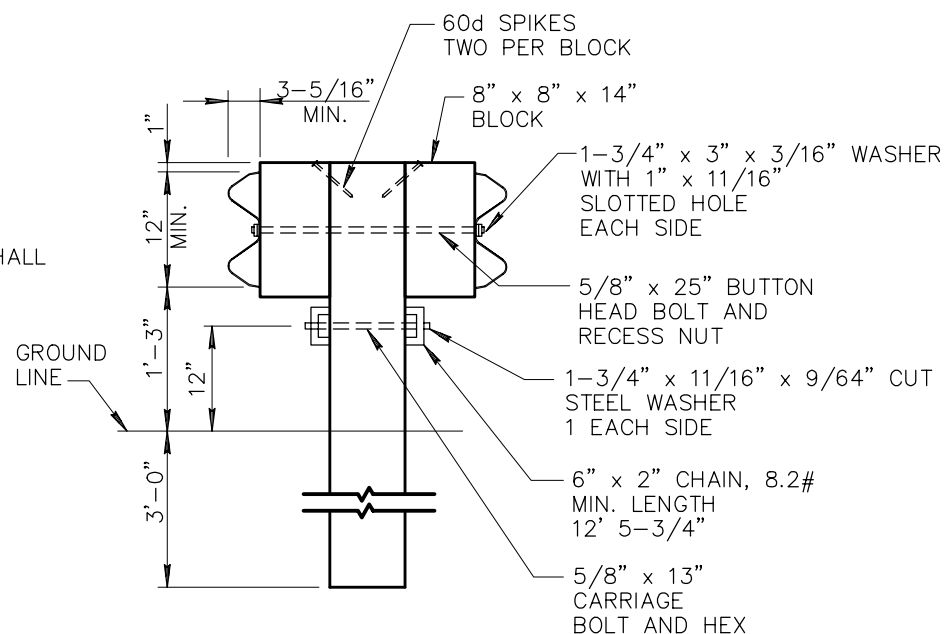
**STANDARD FLARED
TERMINAL SECTION**



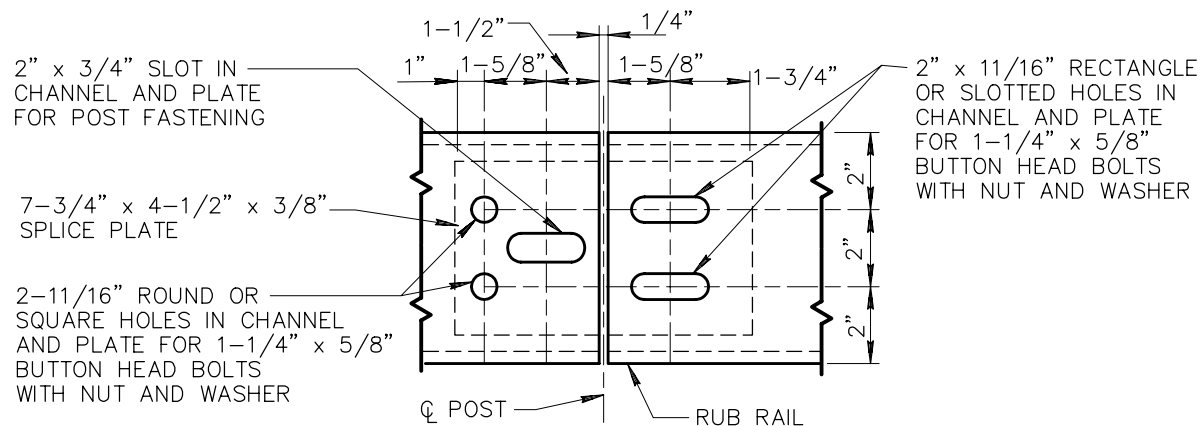
**INSTALLATION OF GUARD RAIL
IN EMBANKMENT CURB SECTION**

NOTES:

1. TOP AND RUB RAIL SHALL NOT PROJECT MORE THAN 1" IF ADJUSTMENT SHORTENING IS REQUIRED, THREADS SHALL BE LEFT IN FUNCTIONAL CONDITION.
2. HORIZONTAL DISTANCE BETWEEN TOP RAIL AND MEDIAN CURB SHALL NOT EXCEED 12"



DETAIL NO. 2 - MEDIAN BARRIER



**DETAIL NO. 3 - RUB RAIL SPLICE
(SPLICE AT POSTS ONLY)**

DETAIL NO.

135-3



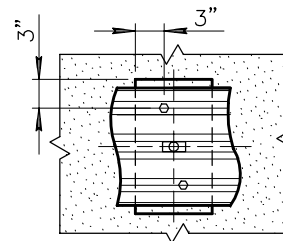
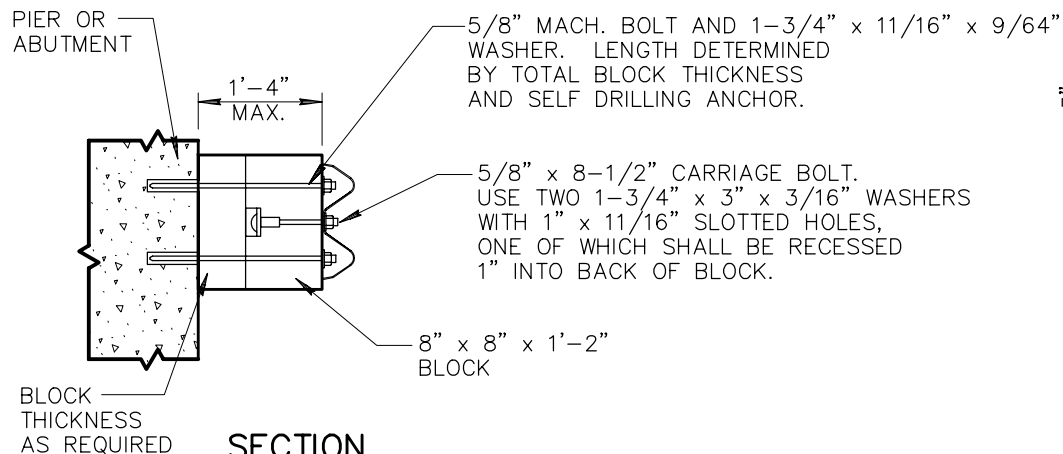
STANDARD DETAIL
ENGLISH

STEEL GUARD RAIL

REVISED

DETAIL NO.

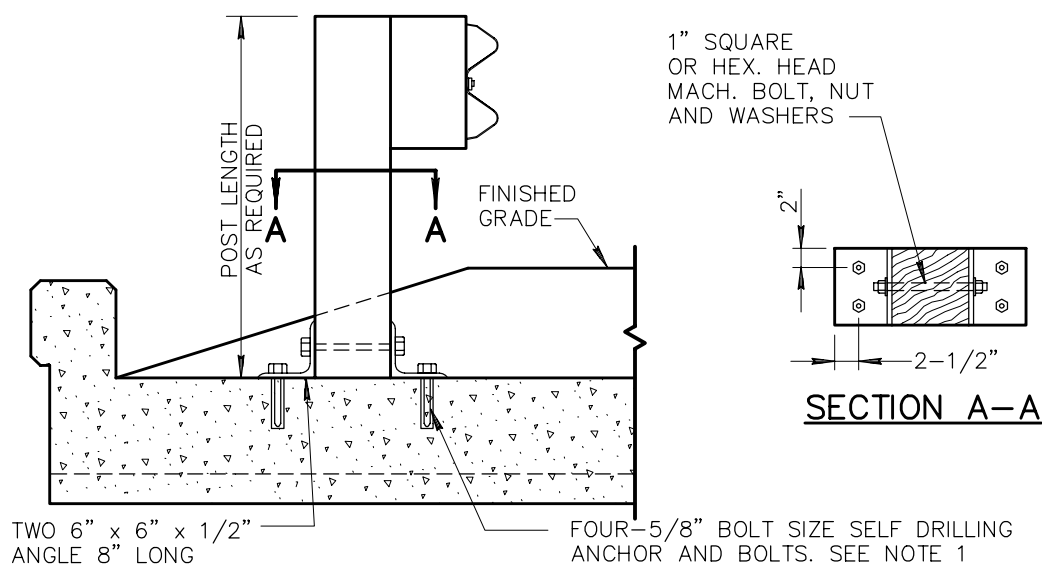
135-3



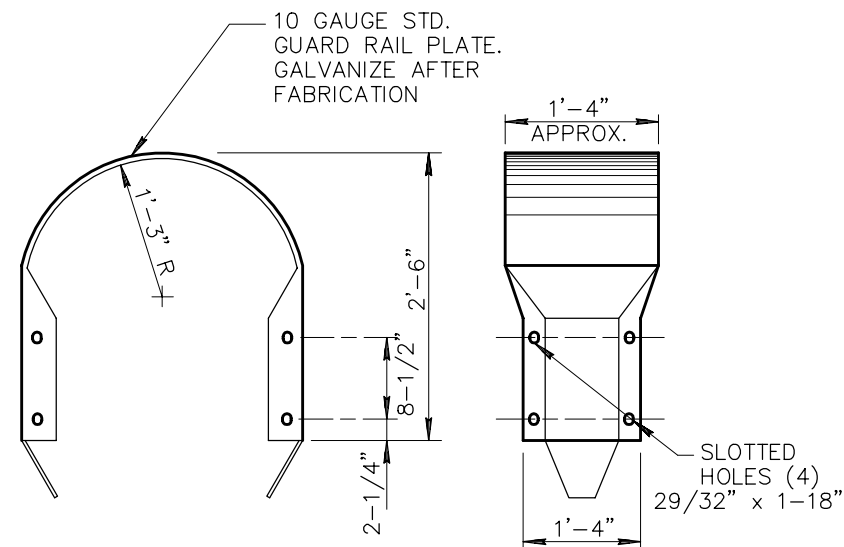
NOTE

1. 5/8" BOLT SIZE SELF DRILLING ANCHOR SHALL HAVE A MINIMUM 1500# PULL OUT STRENGTH IN 2500 P.S.I. CONCRETE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

DETAIL NO. 4 ATTACHMENT OF GUARD RAIL TO STRUCTURES



DETAIL NO. 1 GUARD RAIL POST INSTALLATION ON STRUCTURES



DETAIL NO. 5 BUFFER END SECTION

DETAIL NO.

135-4



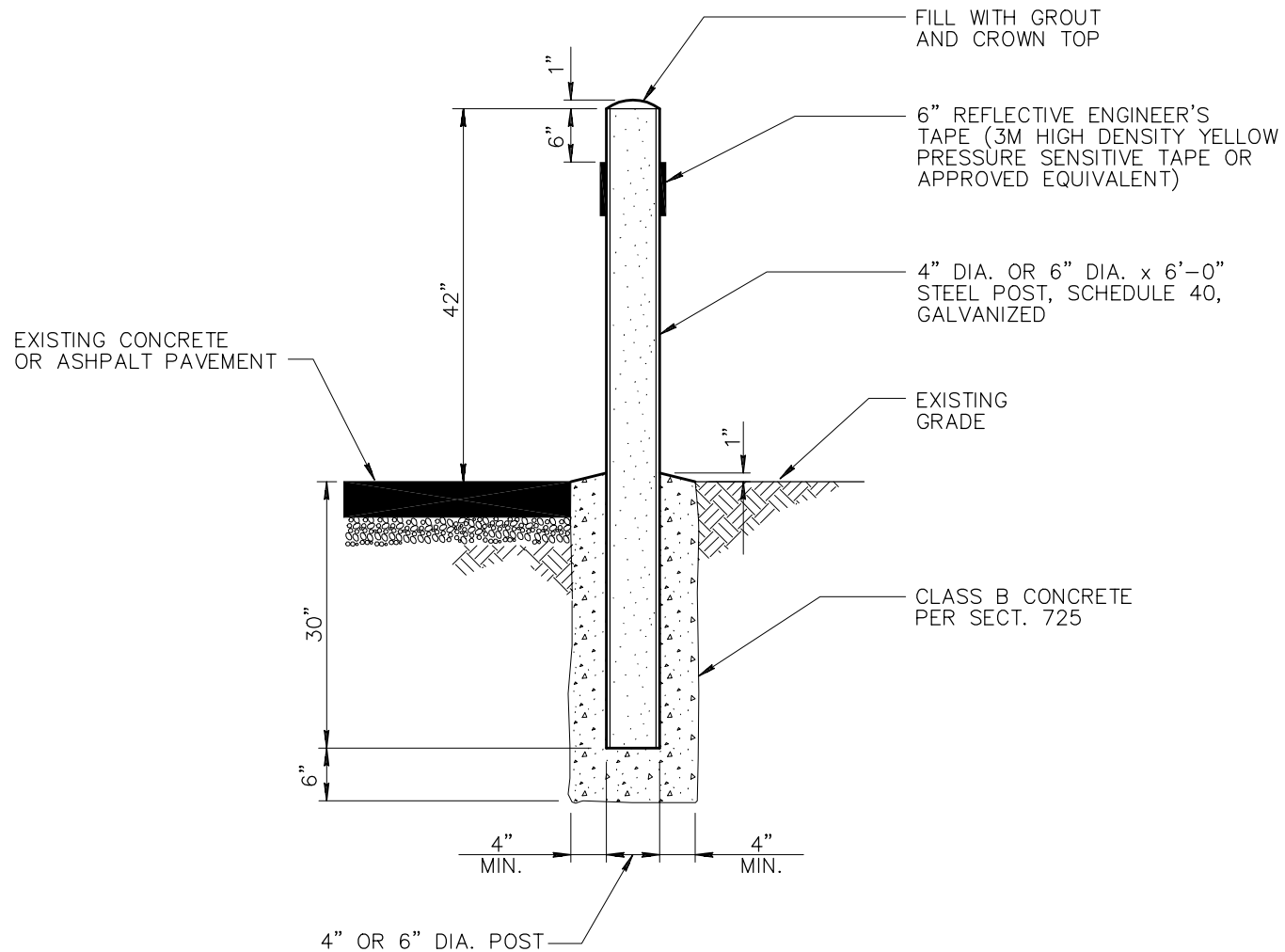
STANDARD DETAIL
ENGLISH

STEEL GUARD RAIL

REVISED

DETAIL NO.

135-4



SAFETY POST SECTION

DETAIL NO.

140



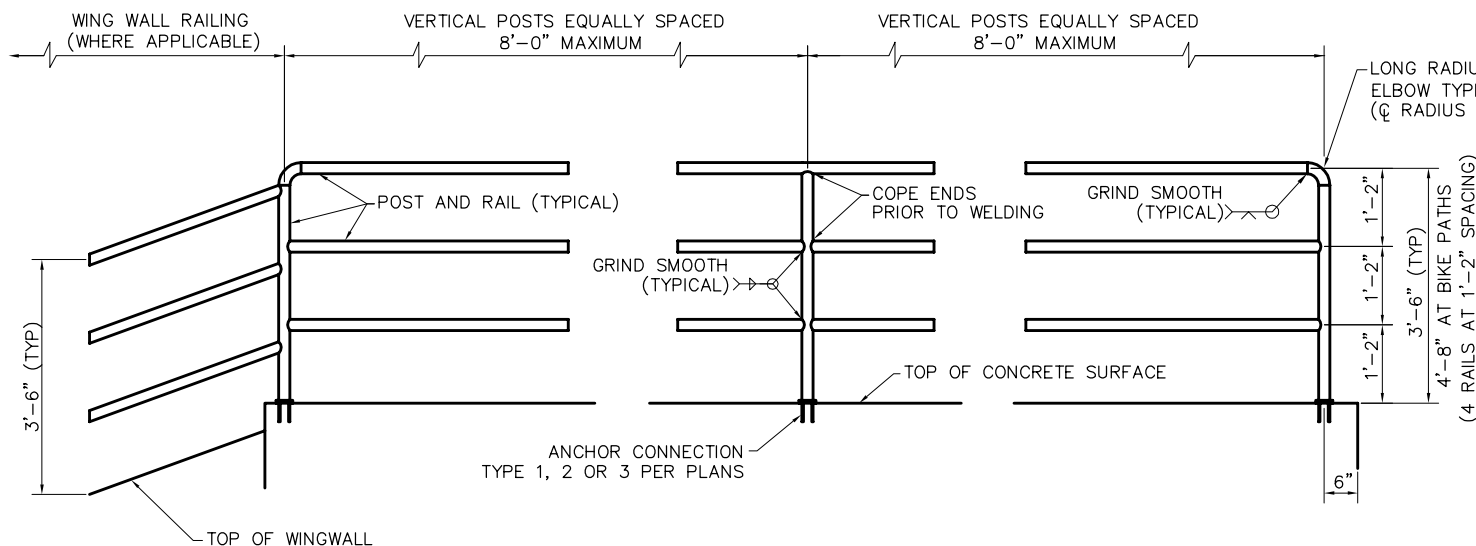
STANDARD DETAIL
ENGLISH

SAFETY POST

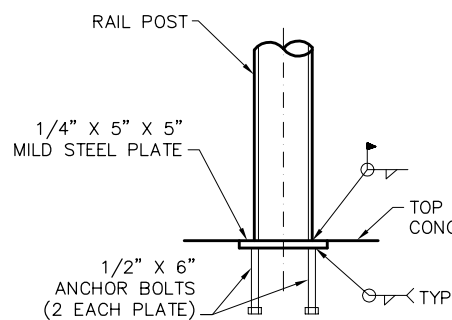
REVISED

DETAIL NO.

140

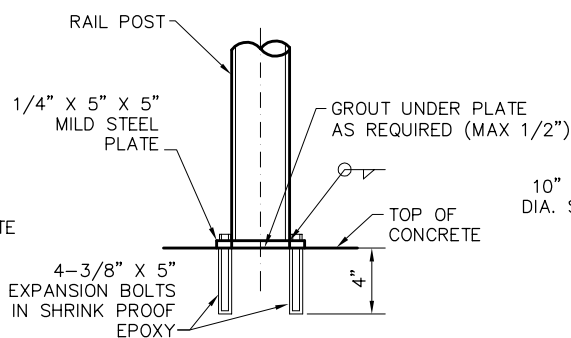


ELEVATION



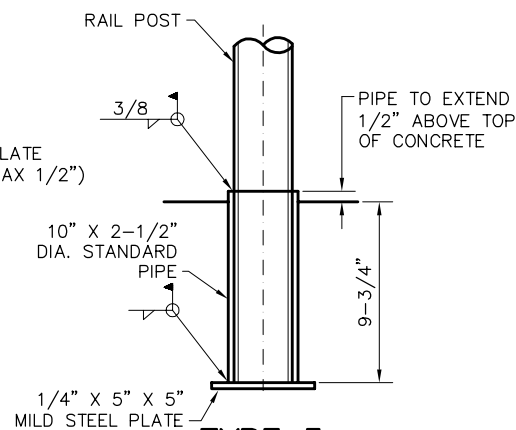
TYPE 1

ANCHOR PLATE DETAIL



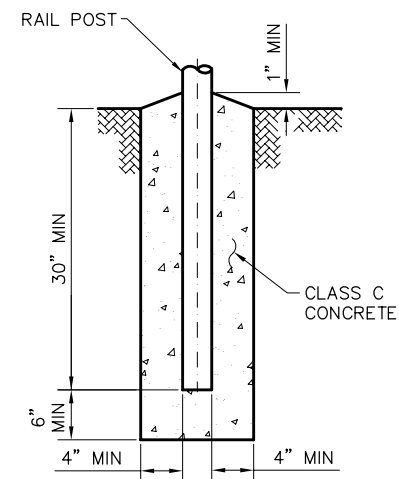
TYPE 2

EXPANSION BOLT DETAIL



TYPE 3

PIPE SLEEVE DETAIL



TYPE 4

GROUND INSTALLATION DETAIL

NOTES:

1. POSTS AND RAILS SHALL BE 1.5" SCHEDULE 40 HOT-DIPPED GALVANIZED STEEL PIPE ASTM A 53, GRADE A (2.72 #/LF, 1.9" O.D.). GALVANIZING SHALL BE IN ACCORDANCE WITH SECTION 771.
2. PAINT RAIL PER MAG SPECIFICATIONS SECTION 530 WHEN REQUIRED BY PLANS. SHOP PRIME WITH RUST INHIBITING PRIMER (FIELD REPAIR PRIMER AS NEEDED). COLOR PER PLANS.
3. VERTICAL POSTS TO BE EVENLY SPACED.
4. REMOVE ALL SHARP EDGES.
5. INSTALL SAFETY RAIL AS REQUIRED BY PLANS OR SPECIFICATIONS.

DETAIL NO.

145



**STANDARD DETAIL
ENGLISH**

SAFETY RAIL

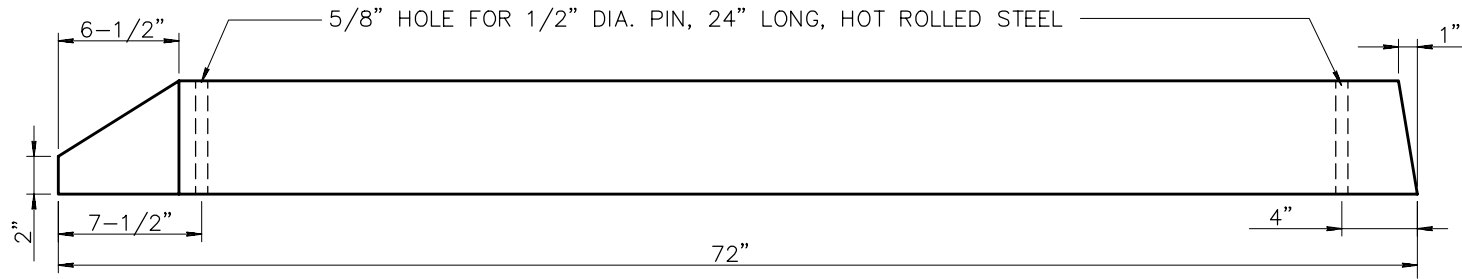
REVISED

01-01-2005

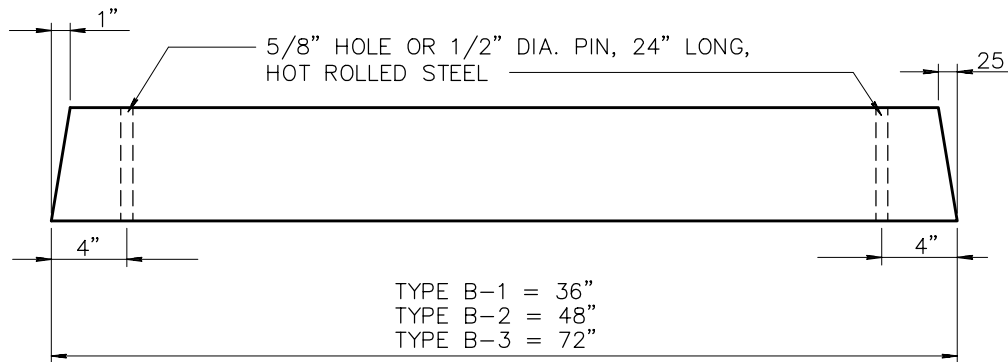
DETAIL NO.

145

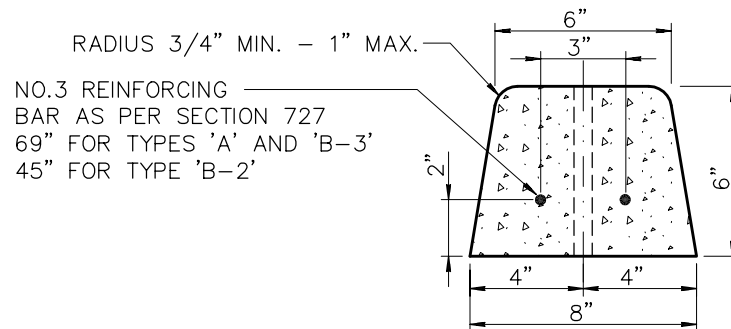
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TYPE A



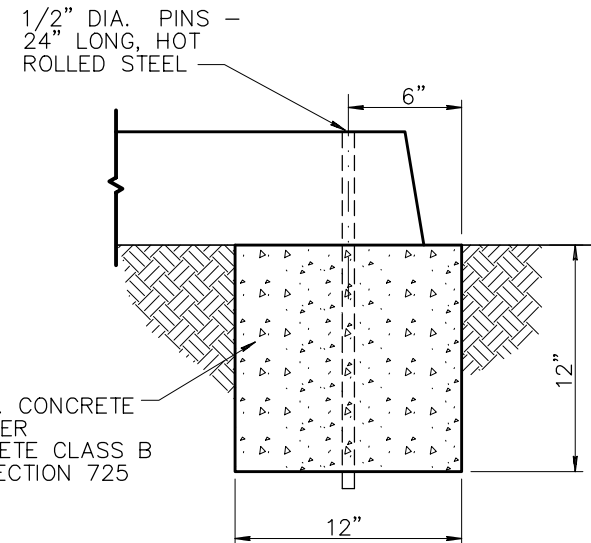
TYPE B-1, B-2, AND B-3



TYPICAL SECTION

NOTES:

1. DIMENSIONAL AND REINFORCEMENT CHANGES WILL BE PERMITTED UPON PRIOR WRITTEN APPROVAL OF THE ENGINEER.
2. UNLESS OTHERWISE NOTED, CONCRETE SHALL BE CLASS 'A' PER SECTION 725.



**SAFETY CURB
INSTALLATION ON DIRT**

DETAIL NO.

150



STANDARD DETAIL
ENGLISH

PRECAST SAFETY CURB

REVISED

DETAIL NO.

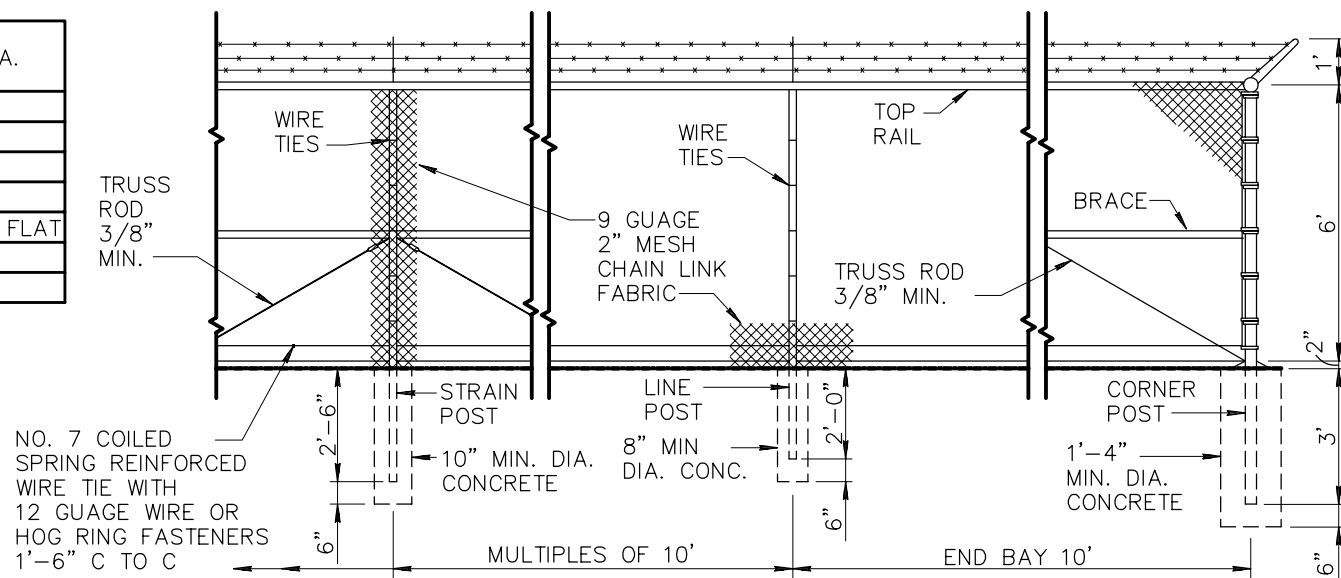
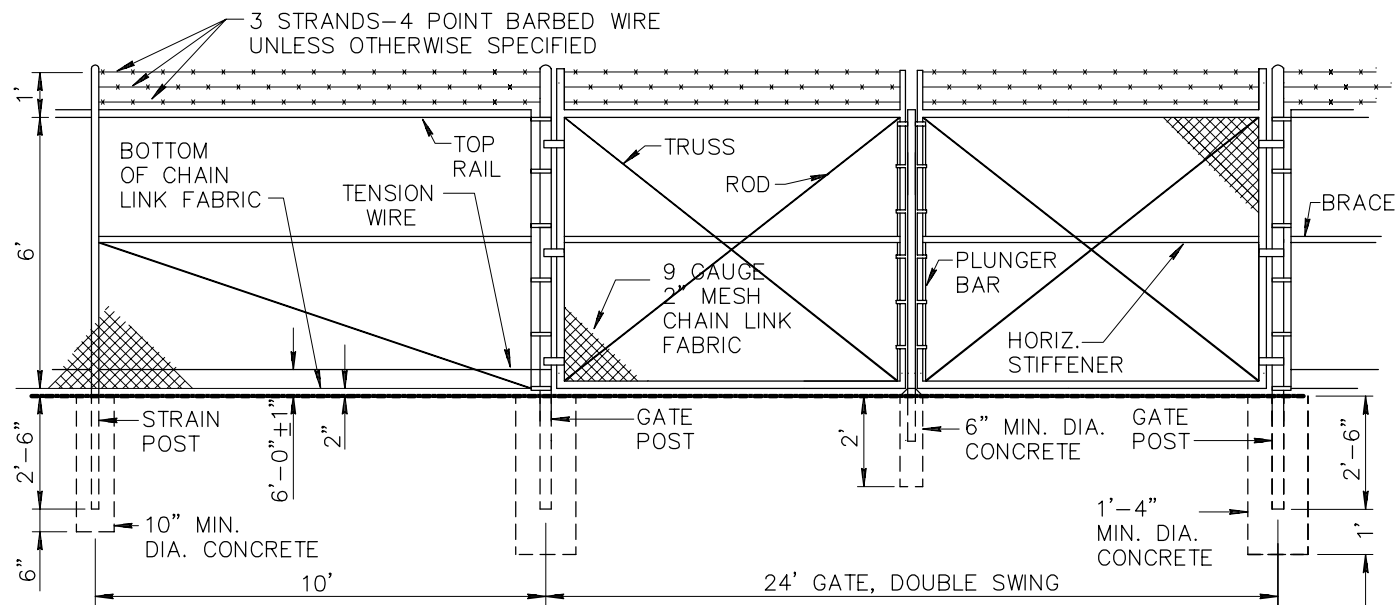
150

NOTES

1. ALL CONCRETE SHALL BE CLASS 'C' PER SECT. 725.
2. FITTINGS NOT SPECIFICALLY DETAILED SHALL BE HEAVY DUTY DESIGN.
3. STRAIN POSTS SHALL BE SPACED AT 500' MAXIMUM SPACING.
4. BOTH CORNER AND STRAIN POSTS SHALL HAVE STRAIN PANELS.
5. ALL POSTS SHALL BE CAPPED.
6. MEMBER SIZES SHALL BE THE FOLLOWING:

MEMBER	AISC SIZE	OUTSIDE DIA.
CORNER POST	2-1/2"	2.875"
LINE POST	1-1/2"	1.900"
STRAIN POST	1-1/2"	1.900"
BRACE	1-1/4"	1.666"
STRETCH BAR	3/16"x3/4" FLAT	3/16"x3/4" FLAT
GATE POST	3-1/2"	4.000"
TOP RAIL	1-1/4"	1.666"

7. CONSTRUCTION AND MATERIALS SHALL CONFORM TO SECT. 420 AND 722, RESPECTIVELY. SEE TABLE 722 FOR WEIGHTS OF MEMBERS.



DETAIL NO.

160



**STANDARD DETAIL
ENGLISH**

**6' CHAIN LINK
FENCE AND GATE**

REVISED

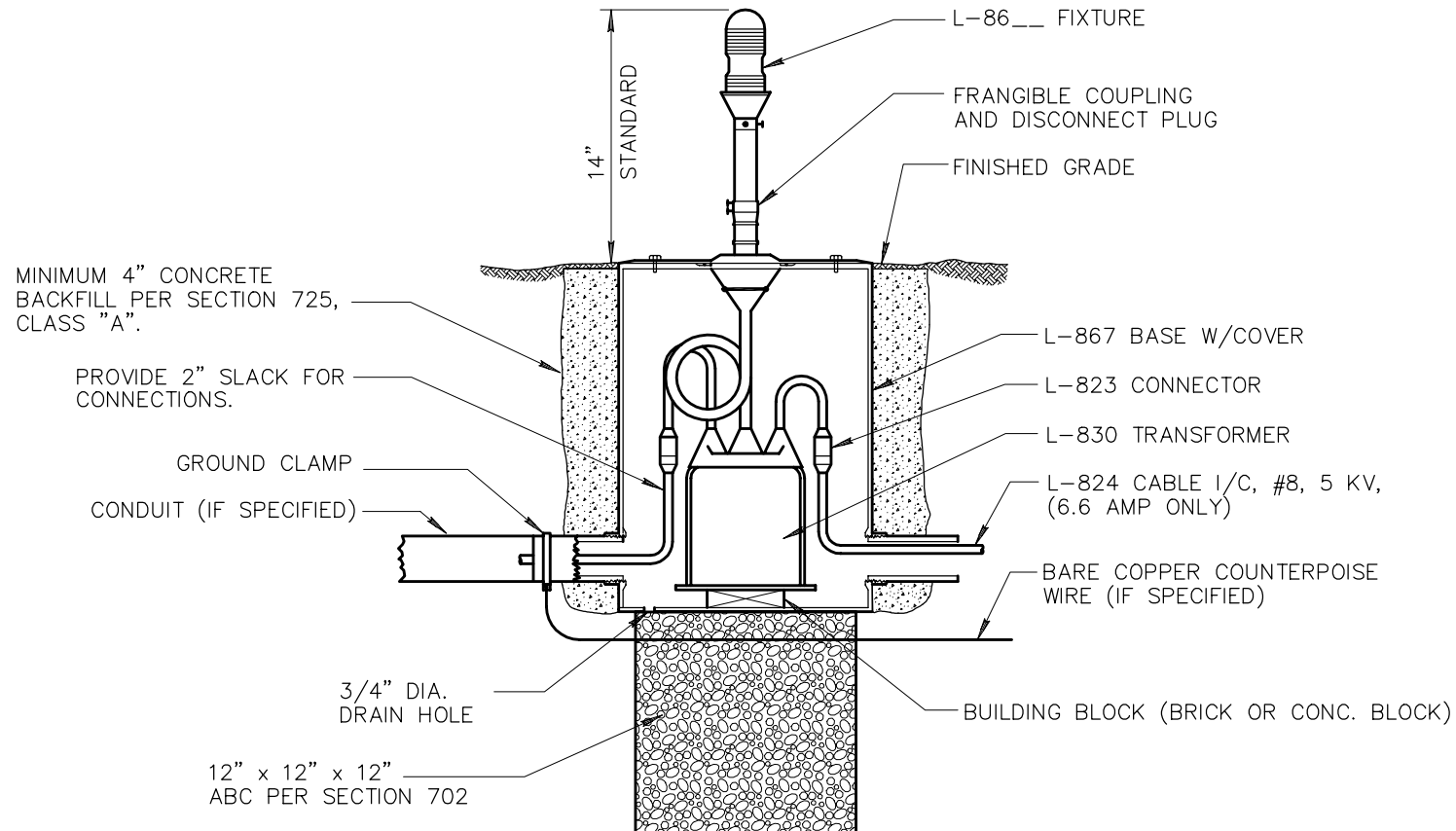
01-01-2003

DETAIL NO.

160

NOTE:

L-xxx NUMBERS DESIGNATES FAA SPECIFICATION NO.



DETAIL NO.

170



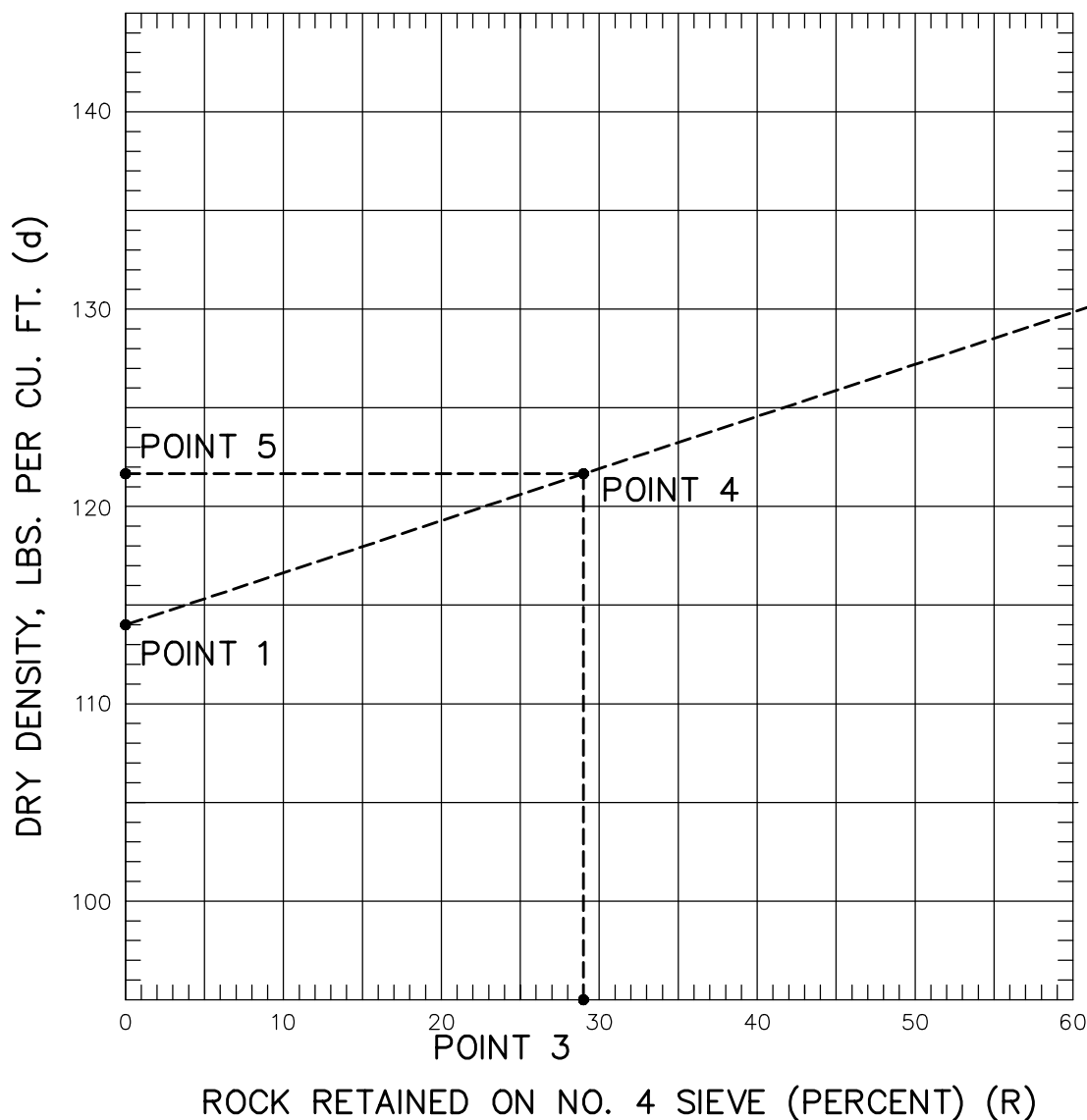
STANDARD DETAIL
ENGLISH

TYPICAL RUNWAY OR TAXIWAY
EDGE LIGHTING DETAIL

REVISED

DETAIL NO.

170



USE THE FOLLOWING FORMULA TO
DETERMINE MAXIMUM DENSITY:

$$D = \frac{(100-R)d+0.9RS \times 62.4}{100}$$

OR USE THE GRAPH

AS SHOWN BELOW:

WHERE:

D = DRY DENSITY OF SAMPLE CONTAINING
R PERCENT ROCK, LBS. PER CU. FT.

R = PERCENT ROCK RETAINED ON A
NO. 4 SIEVE.

d = DRY DENSITY OF PORTION PASSING
NO. 4 SIEVE LBS. PER CU. FT.

S = BULK SPECIFIC GRAVITY OF ROCK.

EXAMPLE:

GIVEN A MATERIAL THAT HAS A DRY DENSITY
OF 114 LBS PER CU. FT, A SPECIFIC GRAVITY
OF 2.5, AND GIVEN THAT ONLY 29% OF A
PORTION PASSES THROUGH A NO. 4 SIEVE,
WHAT IS THE DRY DENSITY OF THE SAMPLE ?

SOLUTION:

- STEP 1: PLOT THE DRY DENSITY OF MATERIAL PASSING A NO. 4 SIEVE (d) ON LEFT SIDE OF GRAPH (POINT 1)
(EXAMPLE: POINT 1 SHOWS d = 114 LBS. PER. CU.FT.);
- STEP 2: PLOT THE BULK SPECIFIC GRAVITY OF ROCK (S) ON RIGHT MONOBAR (POINT 2) (EXAMPLE POINT 2 SHOWS S = 2.5);
- STEP 3: CONNECT POINTS 1 AND 2 TO FORM LINE 1-2;
- STEP 4: PLOT THE PERCENT OF ROCK RETAINED ON A NO. 4 SIEVE ON THE BOTTOM OF THE GRAPH (POINT 3);
(EXAMPLE: POINT 3 SHOWS R = 29 PERCENT)
- STEP 5: DRAW HORIZONTAL LINE FROM POINT 4 TO LEFT SIDE OF GRAPH (POINT 5);
- STEP 6: READ POINT 5 FOR THE VALUE OF THE DRY DENSITY (D).
(EXAMPLE: POINT 5 SHOWS D = 121.6 LBS. PER CU.FT.)

DETAIL NO.

190



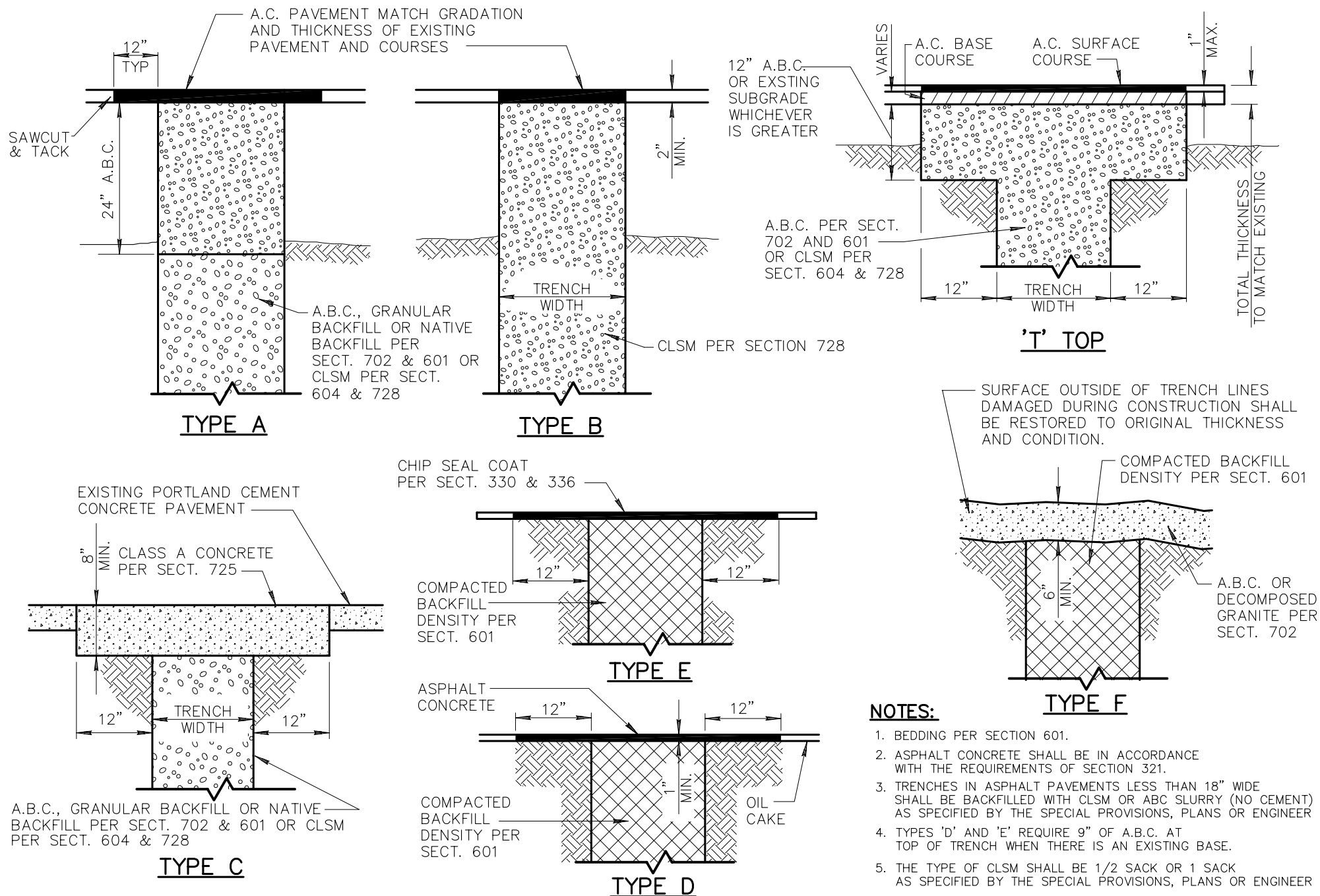
STANDARD DETAIL
ENGLISH

ROCK CORRECTION PROCEDURE FOR MAXIMUM DENSITY DETERMINATION

REVISED

DETAIL NO.

190



DETAIL NO.

200



STANDARD DETAIL
ENGLISH

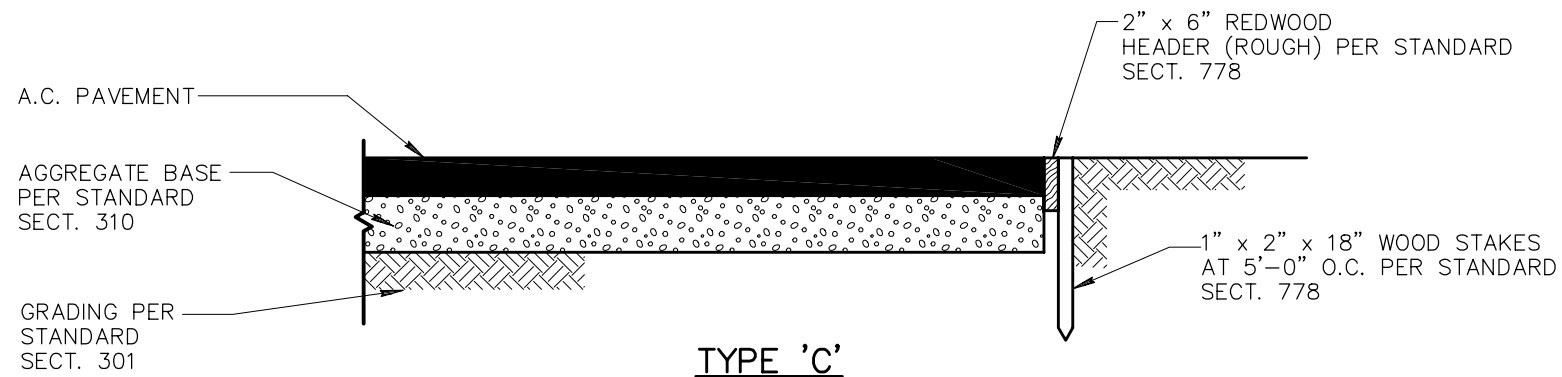
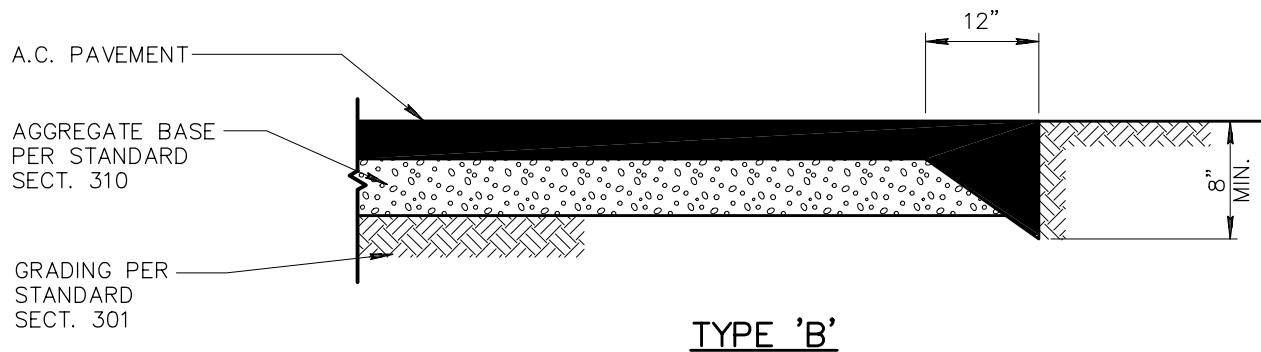
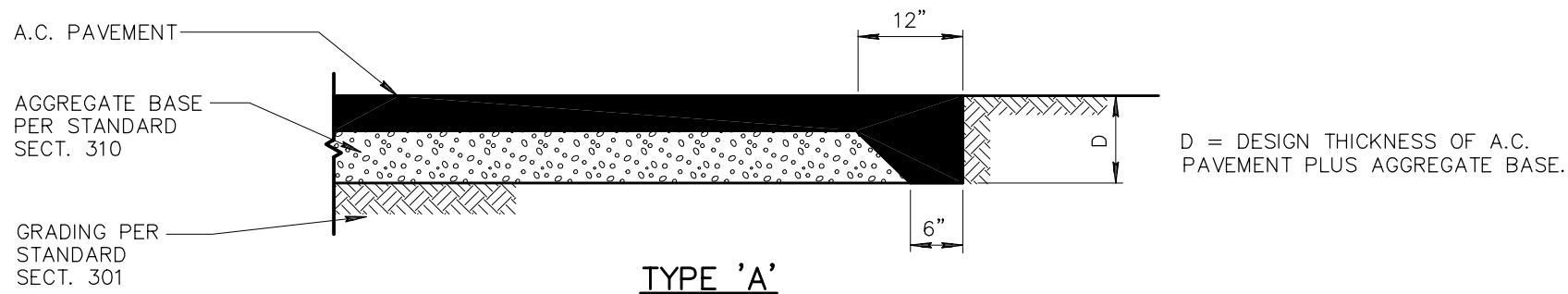
BACKFILL, PAVEMENT AND SURFACE REPLACEMENT

REVISED

01-03-2002

DETAIL NO.

200



DETAIL NO.

201



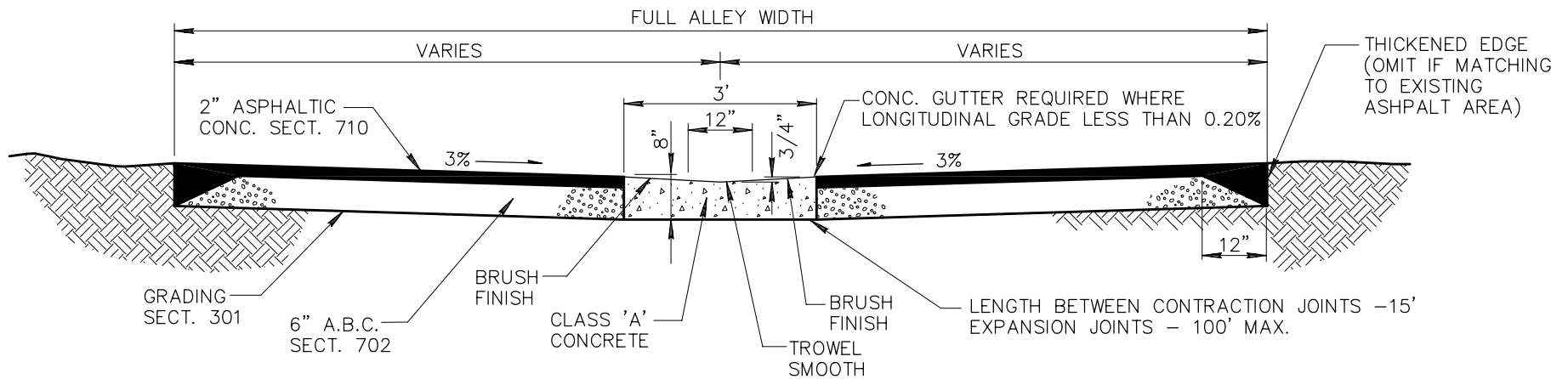
STANDARD DETAIL
ENGLISH

PAVEMENT SECTION AT TERMINATION

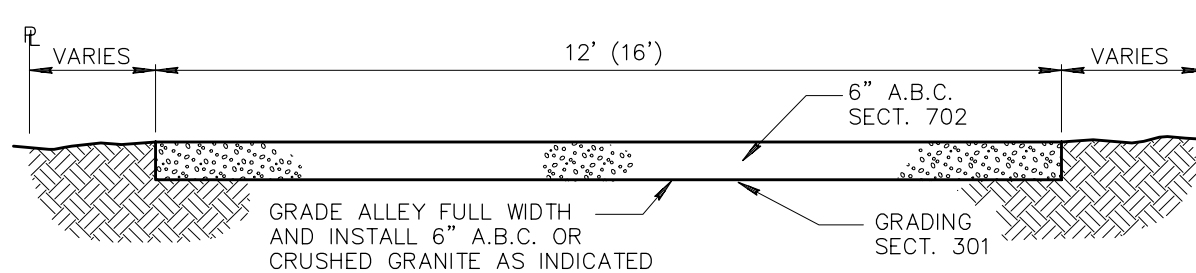
REVISED

DETAIL NO.

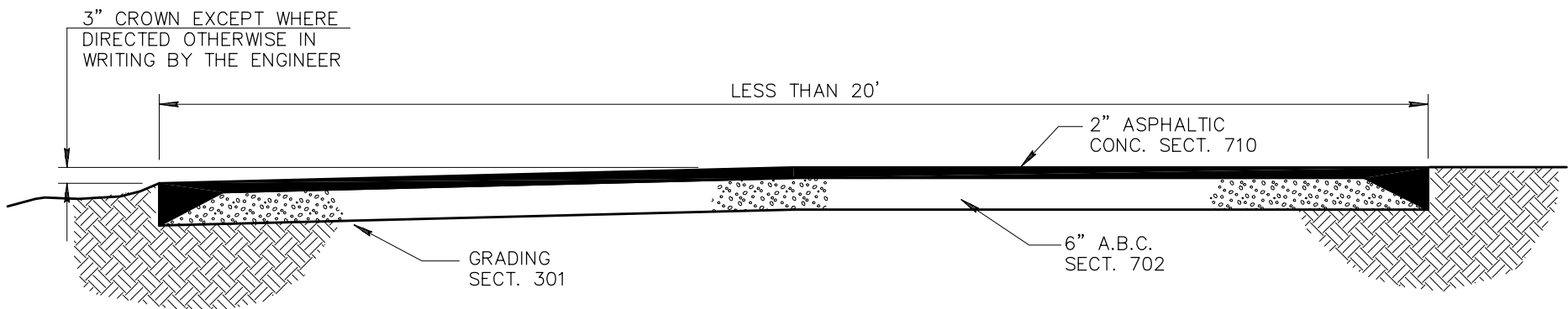
201



PAVED ALLEY DETAIL



UNPAVED ALLEY DETAIL



RESIDENTIAL ALLEY DETAIL

DETAIL NO.

202



MARICOPA
ASSOCIATION of
GOVERNMENTS

STANDARD DETAIL
ENGLISH

ALLEY DETAILS (PAVED AND UNPAVED)

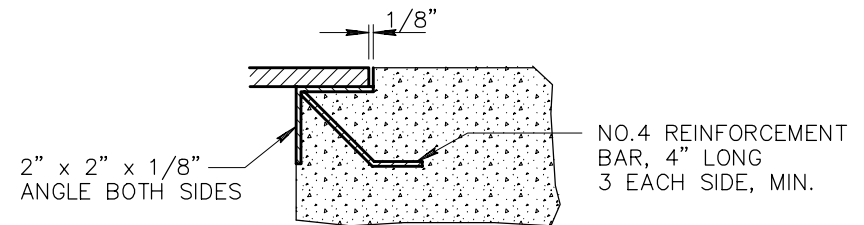
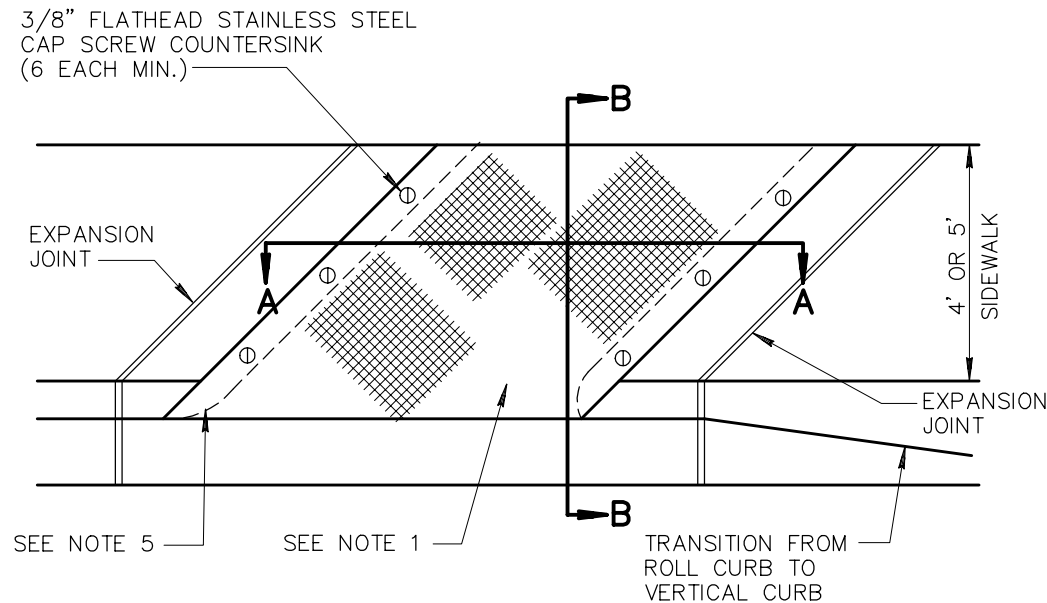
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DETAIL NO.

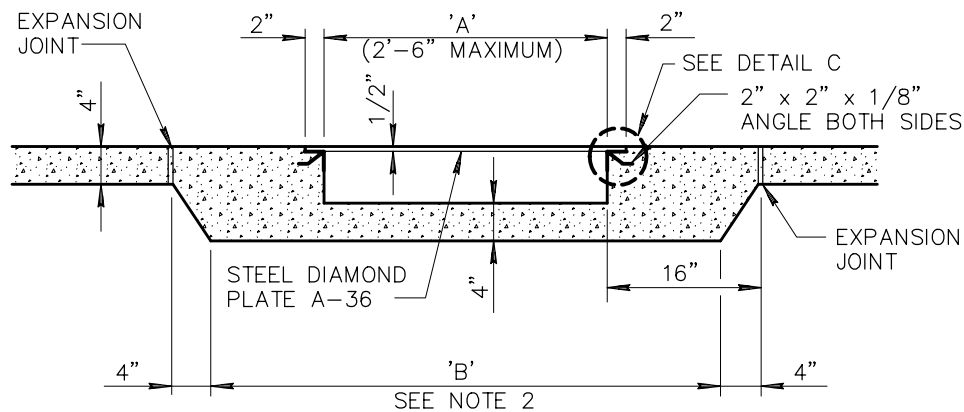
202

NOTES:

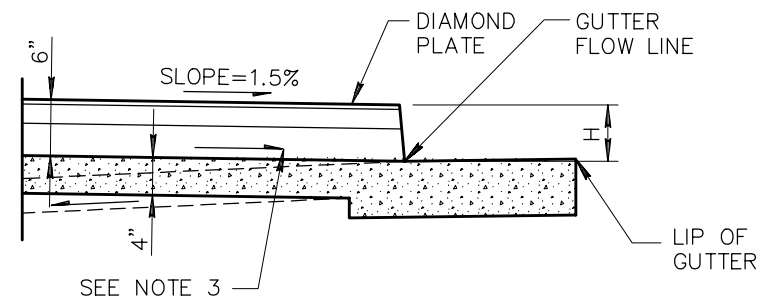
1. ANGLE EQUALS 45° UNLESS SPECIFIED ON PLAN.
2. DIMENSION 'B' EQUALS 'A' + 2'
3. (———>) INDICATES DIRECTION OF FLOW.
4. PAINT STEEL ACCORDING TO SECTION 790.
PAINT NUMBER 1-A OR 1-B.
5. R EQUALS 1" UNLESS OTHERWISE DIRECTED.
6. H EQUALS CURB FACE HEIGHT.
7. FOR ROLL CURB AND GUTTER, USE 2'
TRANSITIONS TO VERTICAL CURB.
8. CONCRETE SHALL BE CLASS B PER SECT. 725
AND INSTALLED PER SECT. 505.



DETAIL C



SECTION 'A-A'



SECTION 'B-B'

DETAIL NO.

203



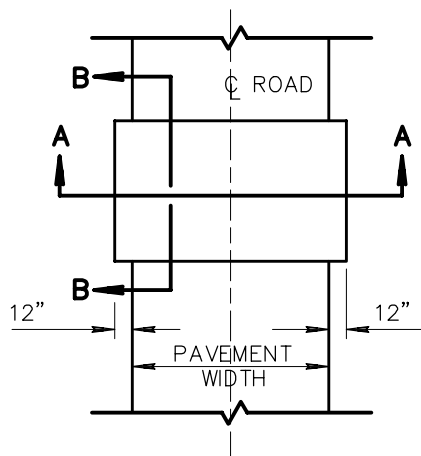
STANDARD DETAIL
ENGLISH

SCUPPERS

REVISED

DETAIL NO.

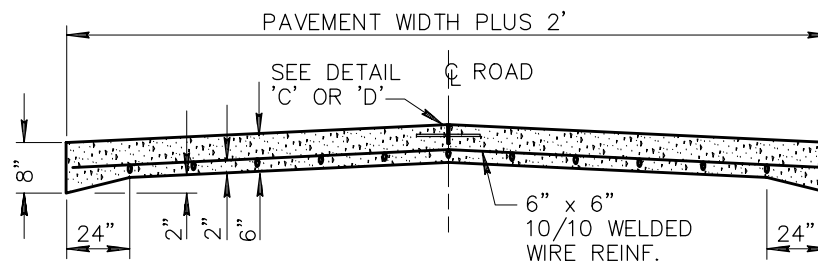
203



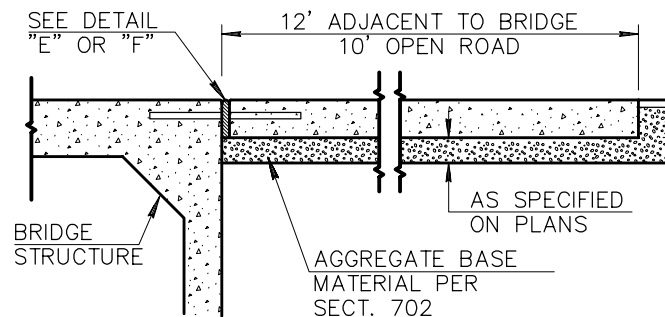
PLAN OF CONCRETE EQUIPMENT CROSSING

NOTES:

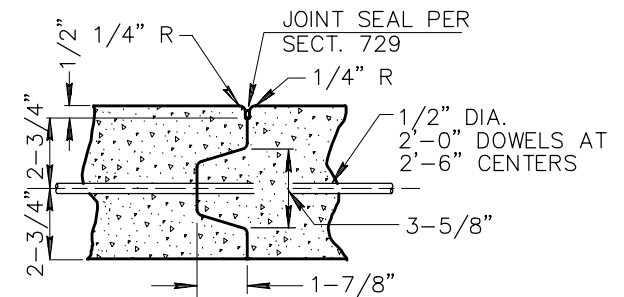
1. WHEN EQUIPMENT CROSSING LIES ADJACENT TO BRIDGE OR BOX CULVERT, CONSTRUCT THE EQUIPMENT CROSSING TO WIDTH OF BRIDGE ROADWAY.
2. ALL DOWELS IN CENTER JOINTS SHALL BE DEFORMED BARS AND SHALL HAVE UNBROKEN BOND. THEY SHALL BE HELD SECURELY IN PLACE, PARALLEL TO THE SUBGRADE AND PERPENDICULAR TO THE CENTER LINE OF THE ROAD.
3. THE EDGING TOOL USED FOR ALL LONGITUDINAL JOINTS SHALL BE SO CONSTRUCTED AS TO PROVIDE A SMOOTH TROWELED SURFACE 3" WIDE ON EACH SIDE OF THE JOINT.
4. IF APPROVED BY THE ENGINEER, OTHER DEFORMATIONS MAY BE USED IN LONGITUDINAL JOINT - DETAIL 'C'.
5. DETAIL 'C' TO BE USED ONLY WHEN FULL WIDTH CAN NOT BE POURED IN ONE POUR. USE DETAIL 'D' IF FULL WIDTH IS POURED IN ONE POUR.



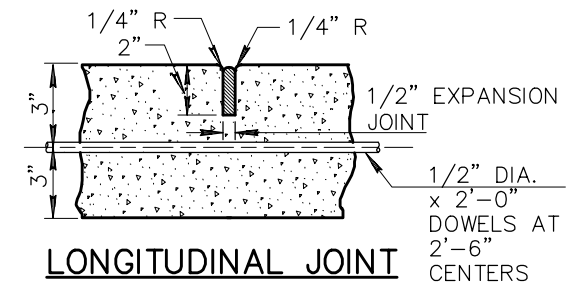
SECTION A-A



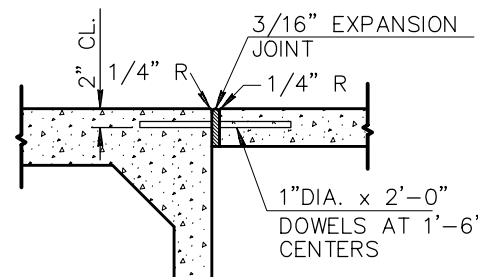
SECTION B-B



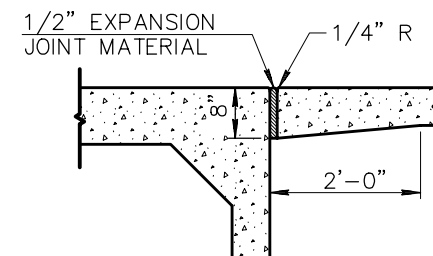
**LONGITUDINAL JOINT
DETAIL 'C'**



**LONGITUDINAL JOINT
DETAIL 'D'**



**JOINT AT NEW BRIDGE
DETAIL 'F'**



**JOINT AT EXISTING BRIDGE
DETAIL 'E'**

DETAIL NO.

204



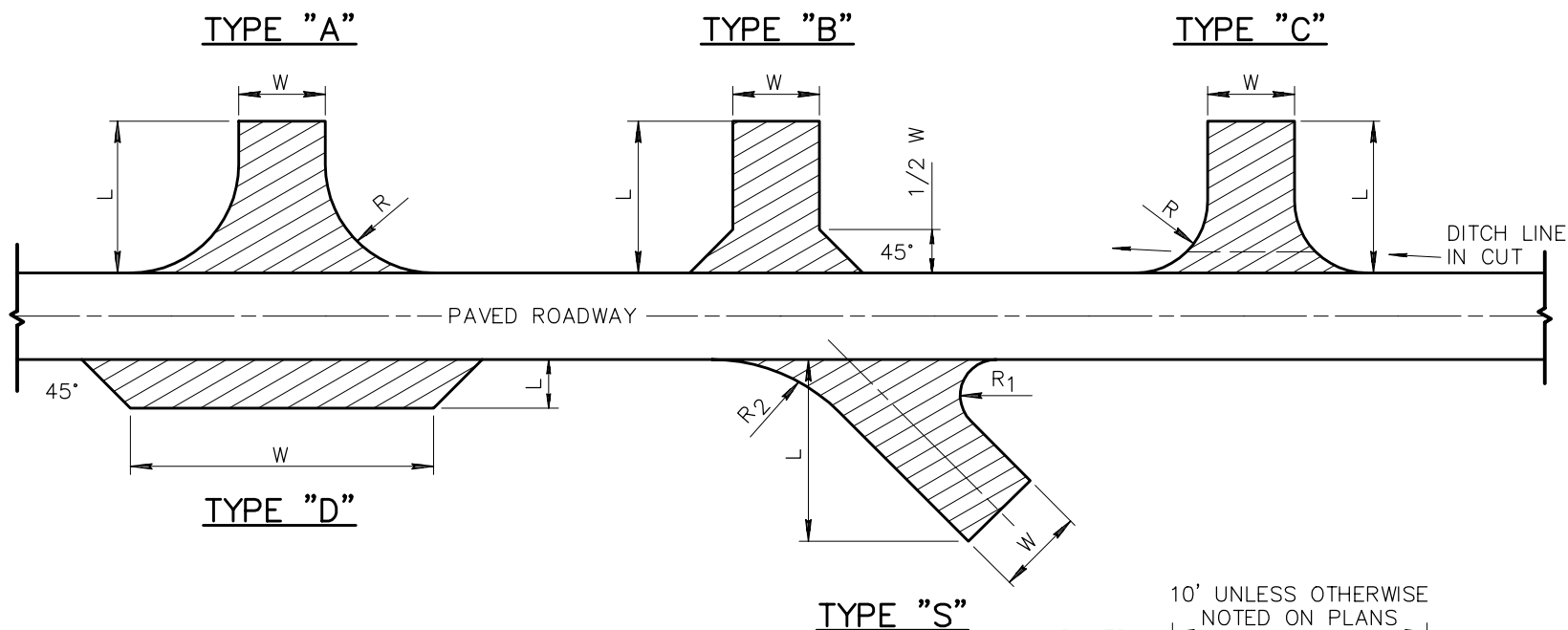
STANDARD DETAIL
ENGLISH

EQUIPMENT CROSSING

REVISED

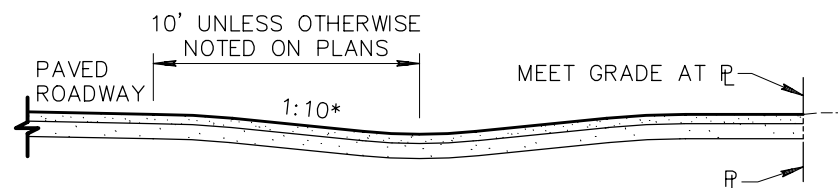
DETAIL NO.

204

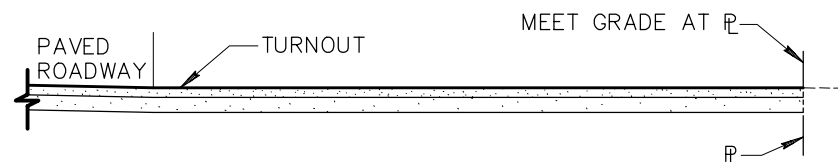


NOTES:

1. W - INDICATES WIDTH OF PAVED SURFACE OF TURNOUT.
L - INDICATES LENGTH OF PAVED SURFACE OF TURNOUT.
R - RADIUS.
2. SIZE AND TYPE OF TURNOUT SHALL BE NOTED ON PLANS AS FOLLOWS:
90° - NO RADUIS: WxL-SURFACE-TYPE; (12' x 30'-A.C.-TYPE "B" TURNOUT).
90° - WITH A RADIUS: WxLxR-SURFACE-TYPE; (12' x 20' x 15'-A.C.-TYPE "C" TURNOUT). OTHER THAN 90° WITH 2 RADII-TYPE "S": WxLxR₁ xR₂-SURFACE-TYPE; (12' x 20' x 15'-A.C.-TYPE "S" TURNOUT).
OR IT MAY BE NOTED ON PLANS IN CONVENTIONAL TERMS.
3. TURNOUTS TO BE STRAIGHT TYPE UNLESS OTHERWISE NOTED ON PLANS.
4. A.C. AND BASE MATERIAL THICKNESS FOR TURNOUTS SHALL BE THE SAME AS SHOWN ON THE ROADWAY SECTION, UNLESS OTHERWISE NOTED.
5. ANY EXCAVATION OR EMBANKMENT FOR TURNOUTS IS INCLUDED IN THE ROADWAY QUANTITIES.
6. TURNOUTS ARE TO BE PLACED WHERE SHOWN ON PLANS, OR AS DIRECTED BY THE ENGINEER.



TYPICAL VALLEY GUTTER TURNOUT



TYPICAL STRAIGHT TURNOUT

* UNLESS OTHERWISE NOTED ON PLANS

DETAIL NO.

205



STANDARD DETAIL
ENGLISH

PAVED TURNOUTS

REVISED

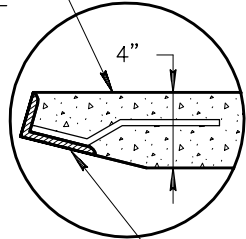
DETAIL NO.

205



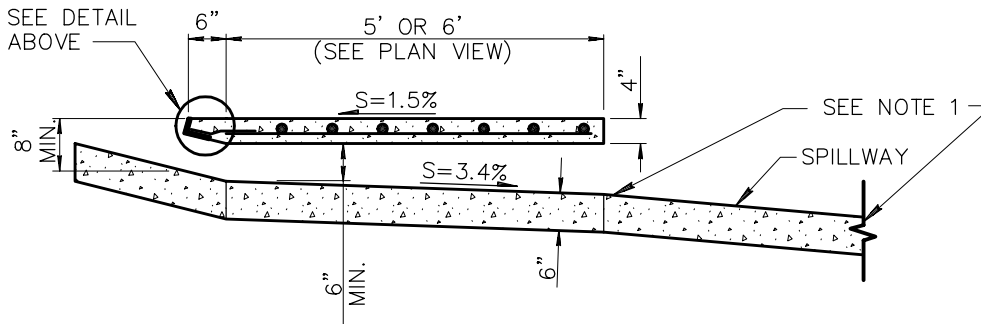
1. UNLESS OTHERWISE NOTED, CONCRETE SHALL BE CLASS 'B' PER SECTION 725.

ANCHOR BAR
WELDED TO
ANGLE



ANGLE
1/2" x 3" x 4"

SEE DETAIL
ABOVE



SECTION D-D

NOTES:

1. TRANSITION TO SPILLWAY/CHANNEL
AS PER APPROVED PLANS.
2. A CENTER WALL SHALL BE INSTALLED IN
SCUPPERS WIDER THAN 4' OR IF MORE
THAN 1 SCUPPER IS BUILT IN SERIES.
3. EXPANSION JOINT FILLER SHALL BE 1/2"
BITUMINOUS TYPE PREFORMED EXPANSION
JOINT FILLER, A.S.T.M. D-1751.
4. UNLESS OTHERWISE NOTED, CONCRETE SHALL BE
CLASS 'B' PER SECTION 725.

DETAIL NO.

206-2



STANDARD DETAIL
ENGLISH

CONCRETE SCUPPER

REVISED

DETAIL NO.

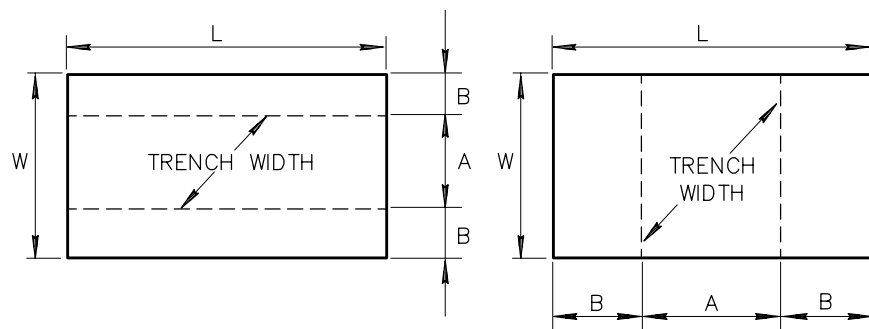
206-2



NOTES:

-
- Diagram illustrating the cross-section of a curb and gutter construction. The diagram shows a sidewalk on the left, followed by a curb and gutter area. The gutter is labeled "EXISTING ROLL OR VERTICAL CURB AND GUTTER". The gutter is filled with material, and the top surface is labeled "MILL OR OVERLAY SEE NOTE NO. 7". The gutter has a "TAPER 12\"/>

SECTION B-B



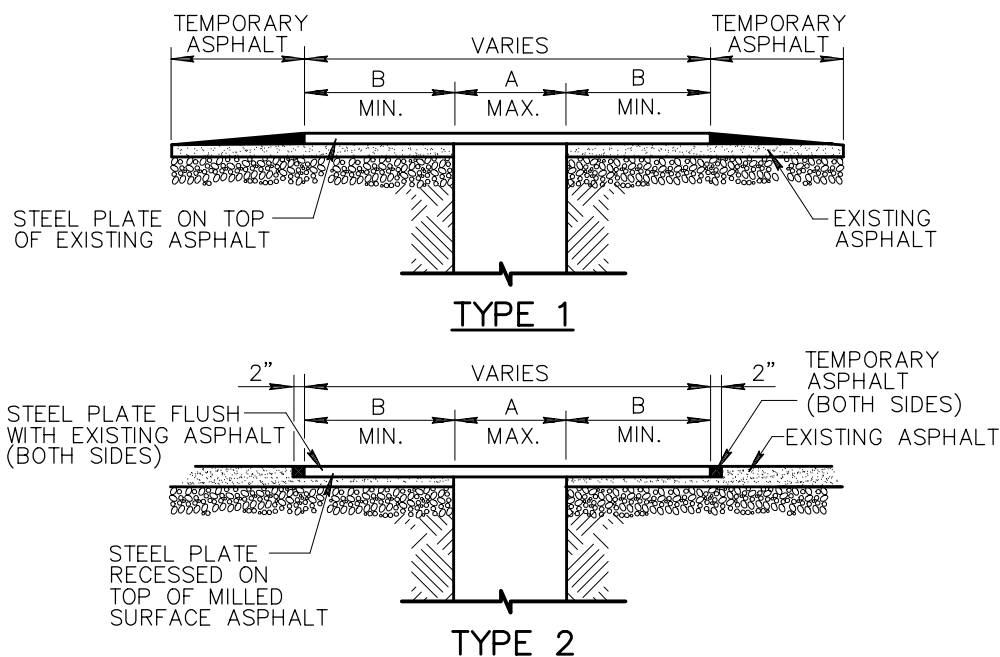
LONGITUDINAL
STEEL PLATE

TRANSVERSE
STEEL PLATE

PLATE SIZE						
LONGITUDINAL					TRANSVERSE	
(A)	(B)	THICKNESS	(W)	(L)	(A)	(B)
12"	18"	1"	4'	8'	58"	19"
12"	18"	1"	4'	10'	58"	31"
24"	18"	1"	5'	10'	70"	25"
36"	18"	1"	6'	10'	44"	38"
48"	18"	1"	7'	10'	52"	34"
60"	18"	1"	8'	10'	58"	31"
12"	18"	1-1/4"	4'	15'	88"	47"
24"	18"	1-1/4"	5'	12'	104"	20"
36"	18"	1-1/4"	6'	12'	66"	39"
36"	18"	1-1/4"	6'	16'	66"	63"
48"	18"	1-1/4"	7'	12'	76"	33"
48"	18"	1-1/4"	7'	16'	76"	58"
60"	18"	1-1/4"	8'	12'	86"	29"
60"	18"	1-1/4"	8'	15'	86"	47"
60"	18"	1-1/4"	8'	16'	86"	63"
60"	18"	1-1/4"	8'	20'	86"	77"
60"	18"	1-3/8"	8'	20'	102"	69"

NOTES:

1. USE TYPE 1 PLATE INSTALLATION WHERE POSTED SPEED LIMIT IS LESS THAN 30 MPH. USE TYPE 2 PLATE INSTALLATION WHERE POSTED SPEED LIMIT IS 30 MPH OR GREATER.
2. FOR TYPE 2 PLATE INSTALLATION, THE STEEL PLATE SHALL BE RECESSED BY MILLING INTO THE EXISTING ASPHALT TO SET FLUSH WITH THE SURFACE OF THE EXISTING ASPHALT. FULL DEPTH CUTTING OF PAVEMENT SECTION OUTSIDE OF TRENCH IS NOT PERMITTED. MILLING DEPTH SHALL MATCH THICKNESS OF PLATE. THE GAP BETWEEN THE EDGE OF THE PLATE AND THE ADJACENT EXISTING ASPHALT PAVEMENT MUST BE FILLED WITH TEMPORARY ASPHALT.
3. TRENCH WIDTHS ARE BASED ON AN ANALYSIS PER THE 14TH EDITION OF STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES BY AASHTO. AN ASSUMED AXLE LOADING OF 12 TONS WITH A 30% IMPACT FACTOR WAS USED. THE AXLE LENGTH IS 6 FEET; THEREFORE THE NUMBER OF WHEELS CARRIED BY A PLATE DEPENDS ON THE ROADWAY WIDTH.
4. STEEL PLATE MUST BE ABLE TO WITHSTAND H-20 TRAFFIC LOADINGS WITHOUT ANY MOVEMENT.
5. PLATES SHALL BE FABRICATED FROM ASTM A36 STEEL (MIN).
6. PLATES SHALL BE SECURED FROM LATERAL MOVEMENT AND VERTICAL VIBRATION (ASSOCIATED NOISE) WHILE IN USE BY TEMPORARY ASPHALT (COLD MIX.)



DETAIL NO.

211



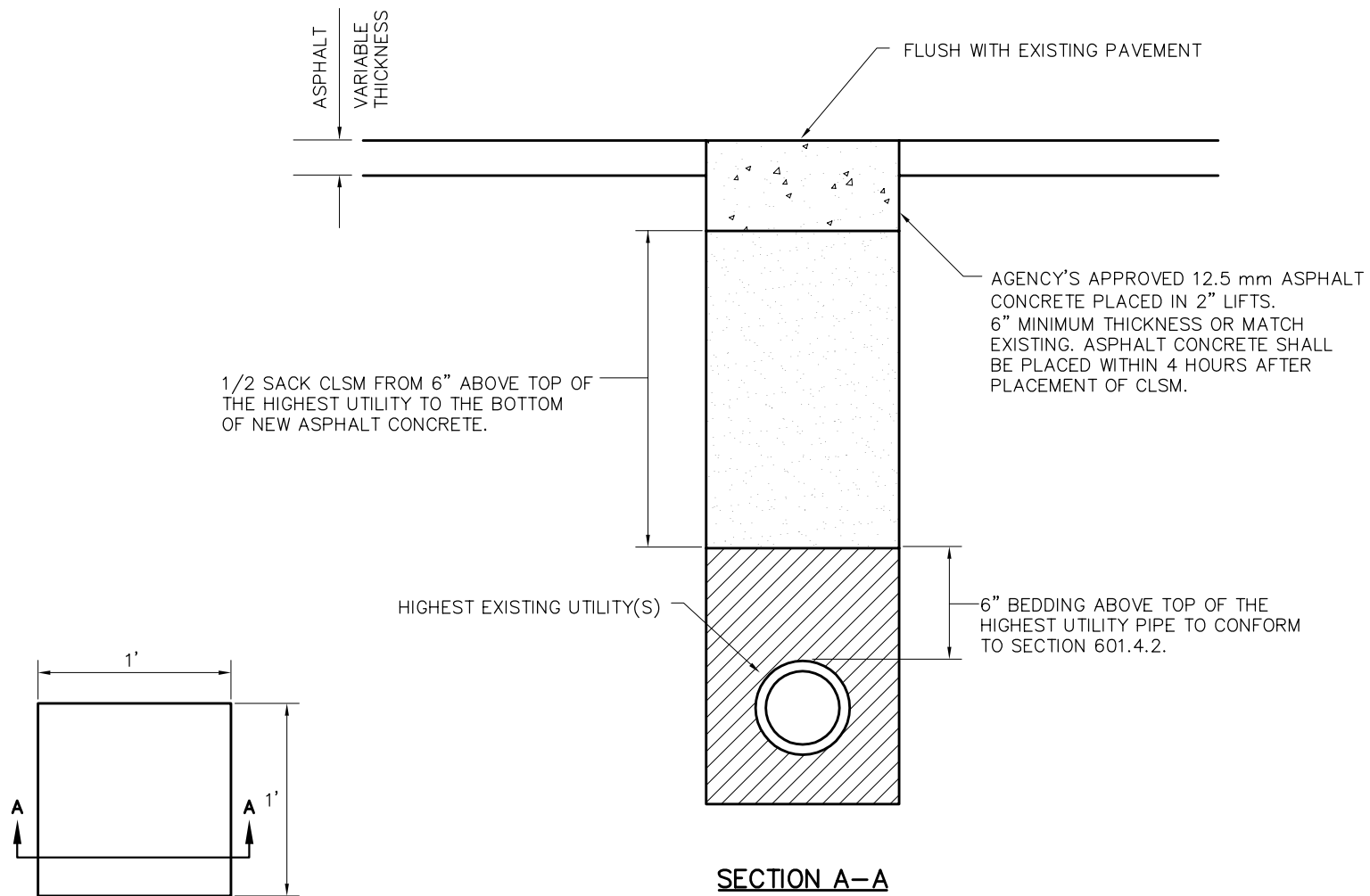
STANDARD DETAIL
ENGLISH

STANDARD TRENCH PLATING DETAIL

REVISED

DETAIL NO.

211



POTHOLE PLAN VIEW
(NOMINAL DIMENSIONS)

DETAIL NO.

212



**STANDARD DETAIL
ENGLISH**

UTILITY POTHOLE REPAIR

REVISED

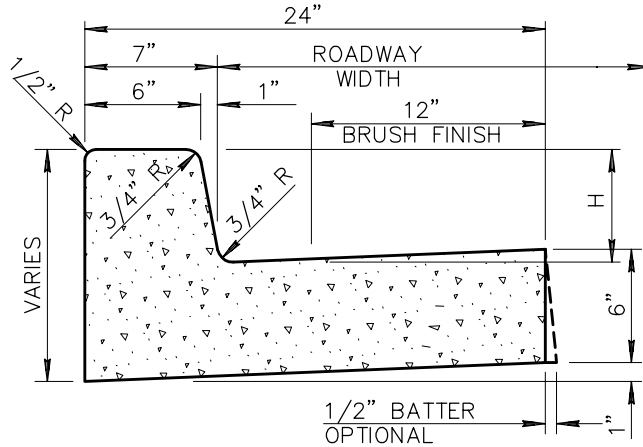
01-01-2005

DETAIL NO.

212

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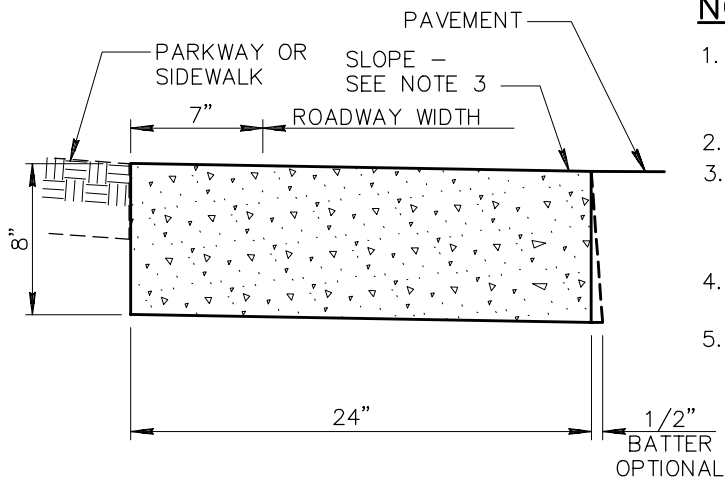
VERTICAL CURB AND GUTTER (TYPE A)



NOTES: (TYPE A)

1. ALL EXPOSED SURFACES TO BE TROWEL FINISHED EXCEPT AS SHOWN. SEE SECT. 340.
2. H=6" OR AS SPECIFIED ON PLANS.
3. CONTRACTION JOINT SPACING 10' MAXIMUM.
4. EXPANSION JOINTS AS PER SECT. 340.
5. CLASS 'B' CONCRETE PER 725.

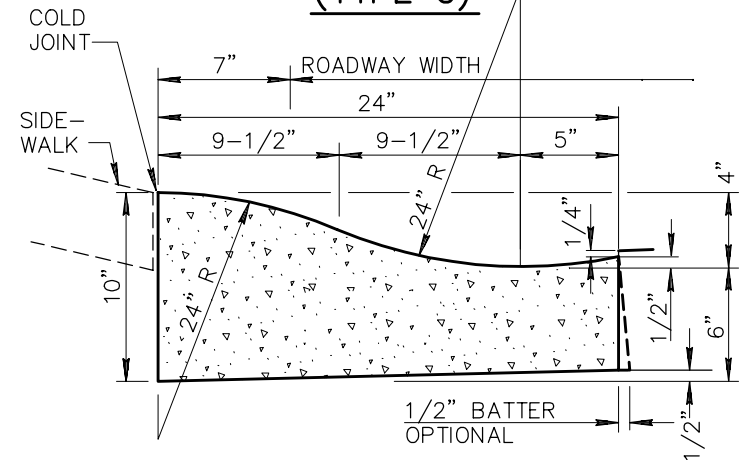
RIBBON CURB (TYPE B)



NOTES: (TYPE B)

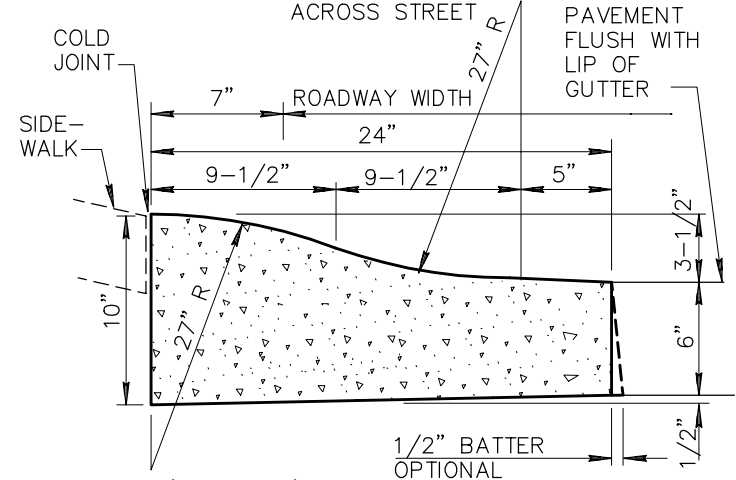
1. CONSTRUCT CURB AND INSTALL 1/2" MASTIC EXPANSION JOINTS, A.S.T.M. D-1751. SECT. 340.
2. BROOM FINISH ALL SURFACES.
3. RIBBON CURB MAY SLOPE TOWARDS PAVEMENT OR PARKWAY AS INDICATED ON PLANS.
4. CONTRACTION JOINT SPACING 10' MAXIMUM.
5. CONCRETE SHALL BE CLASS 'B' PER SECT. 725 AND INSTALLED PER SECT. 505.

ROLL CURB AND GUTTER (TYPE C)



(TYPE D)

SPECIAL SECT. USE FOR HIGH SIDE CURB WITH SHEET DRAINAGE ACROSS STREET



NOTES: (C & D)

1. ALL WORK AND MATERIALS SHALL CONFORM TO SECT. 304, 505 AND 725. BROOM FINISH TO EXPOSED SURFACE.
2. CONTRACTION JOINT SPACING 10' MAXIMUM.
3. EXPANSION JOINTS AS PER SECT. 340.
4. CLASS 'B' CONCRETE PER 725.

DETAIL NO.

220



STANDARD DETAIL
ENGLISH

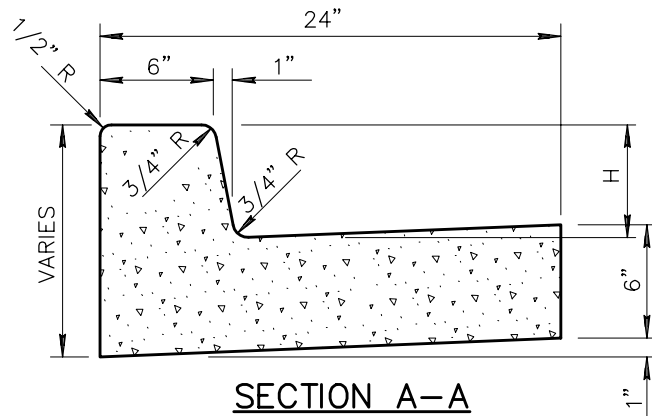
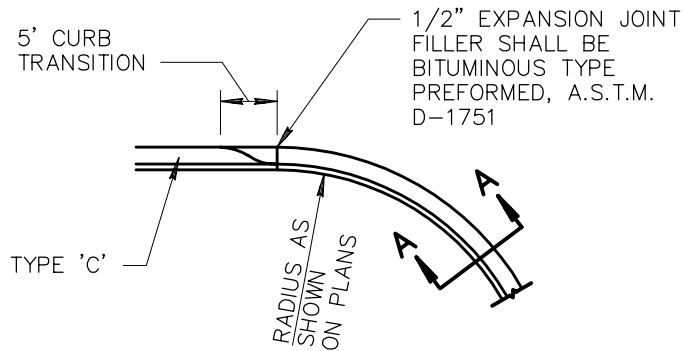
CURB AND GUTTER
TYPES A, B, C AND D

REVISED

DETAIL NO.

220

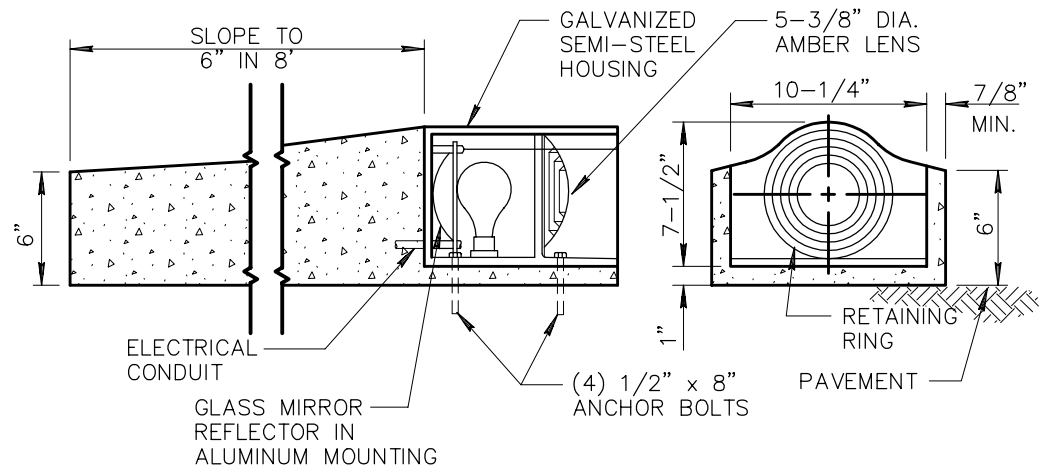
CURB AND GUTTER TRANSITION



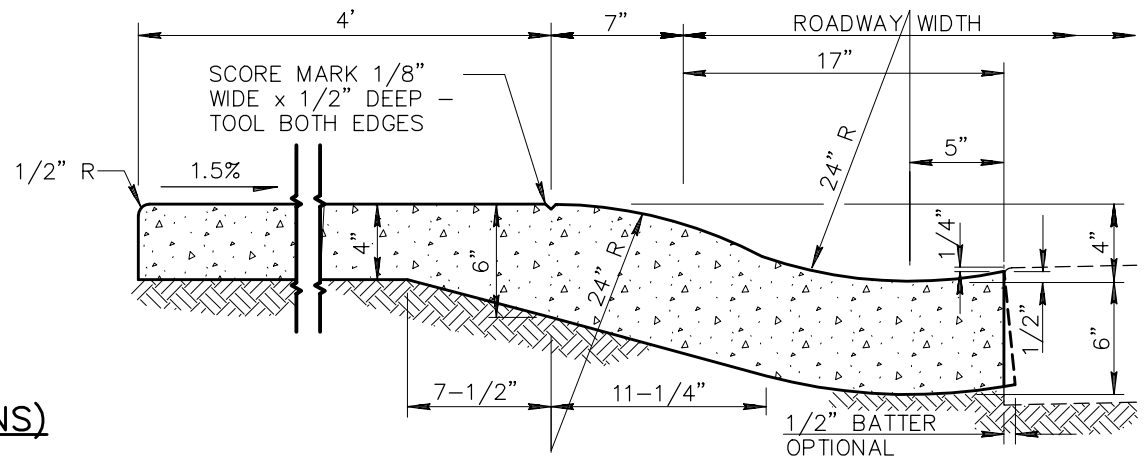
NOTES: (CURB AND GUTTER TRANSITIONS)

1. THE CURB TRANSITION WILL BE PAID FOR AS TYPE 'C'. WHEN A PROJECT CONSISTS OF TYPE 'C' CURB AND GUTTER THROUGHOUT, THE ENTIRE RETURN SHALL BE MEASURED AND PAID FOR AS TYPE 'A'.
2. WHERE PROPOSED CONSTRUCTION IS TO BE CONNECTED TO EXISTING CURB AND GUTTER, THE TRANSITION SHALL BE INDICATED ON PLANS.
3. CLASS 'B' CONCRETE PER SECT. 725.

CURB WARNING BEACON



INTEGRAL ROLL CURB, GUTTER AND SIDEWALK



NOTES:

1. CONCRETE TO BE MONOLITHIC POUR. EXPOSED SURFACE FINISH AS PER SIDEWALK AND GUTTER DETAIL.
2. CONTRACTION JOINT SPACING 16' MAXIMUM.
3. EXPANSION JOINTS PER SECT. 340.
4. CLASS 'B' CONCRETE PER SECT. 725.

DETAIL NO.

221



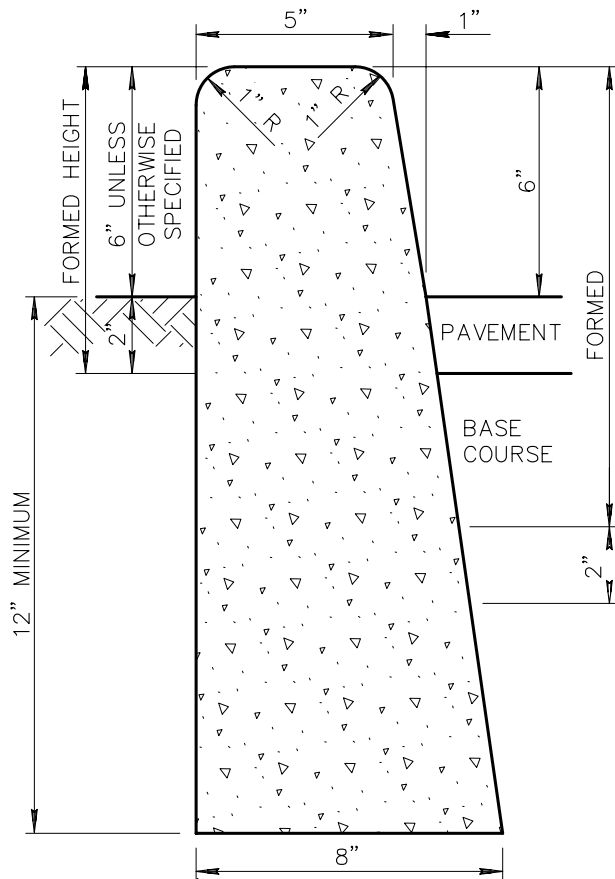
STANDARD DETAIL
ENGLISH

CURB AND GUTTER
(TRANSITION, INTEGRAL & WARNING BEACON)

REVISED

DETAIL NO.

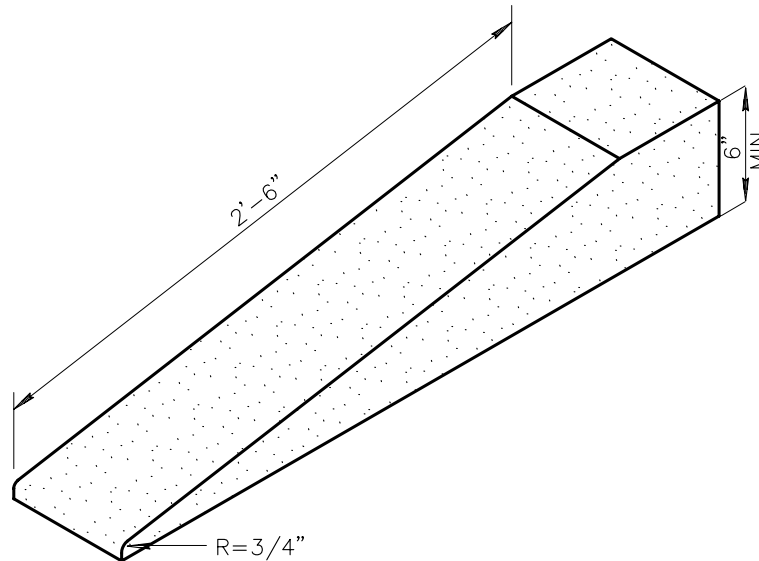
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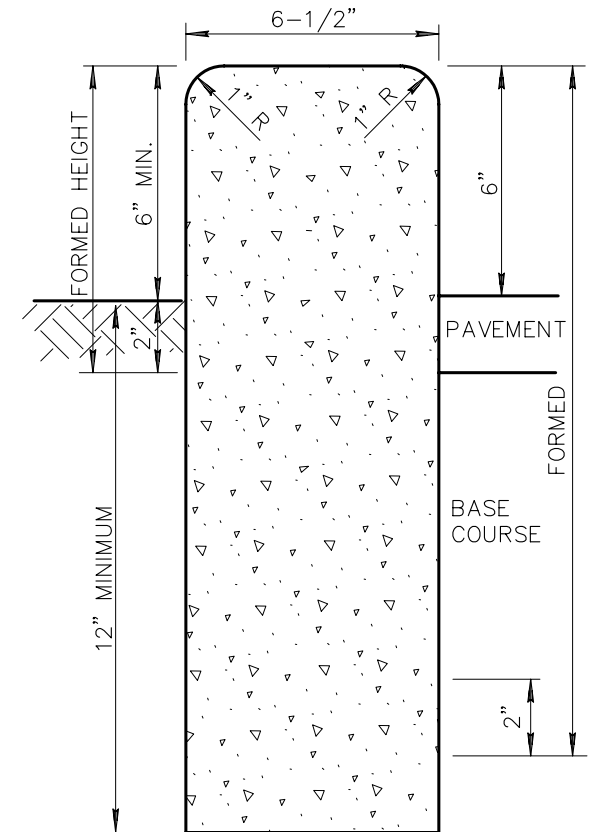
TYPE 'A'

NOTES:

1. ALL VERTICAL SURFACES TO BE FORMED.
2. VERTICAL SURFACES DOWN FROM 2" BELOW UNDISTURBED SOIL MAY BE PLACED AGAINST NEAT CUT IF APPROVED BY THE ENGINEER AND CONCRETE WILL NOT EXTEND MORE THAN 1" BEYOND THEORETICAL FACE.
3. ALL EXPOSED SURFACES TO BE STRIPPED GREEN AND TROWEL FINISHED.
4. CONCRETE CURBS CONFORM TO SECT. 340.
5. MAXIMUM SPACING OF CONTRACTION JOINTS IS 10'.
6. CONCRETE TO BE CLASS 'B' PER SECT. 725.



TYPICAL CURB TERMINATION



TYPE 'B'

DETAIL NO.

222



STANDARD DETAIL
ENGLISH

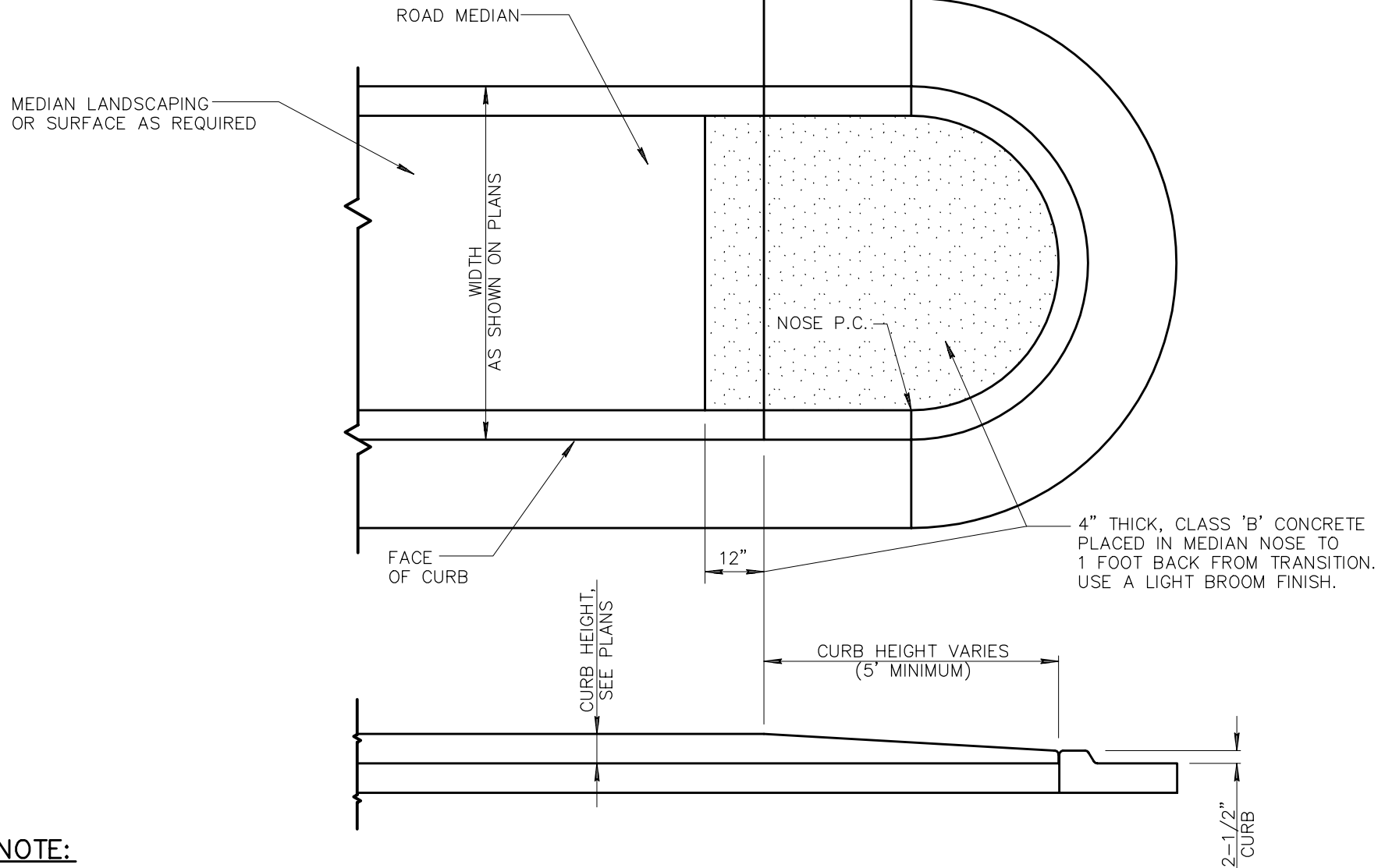
SINGLE CURB -
TYPES A, B AND TERMINATION

REVISED

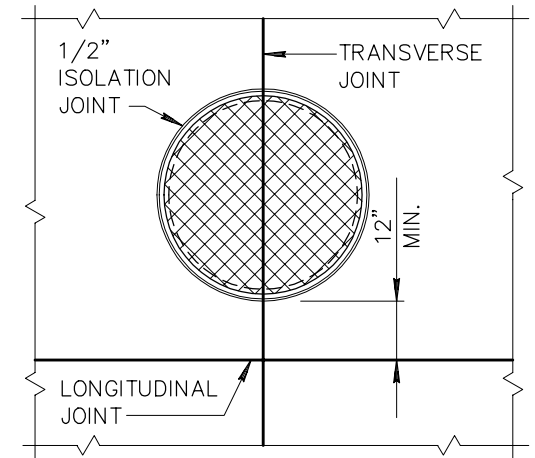
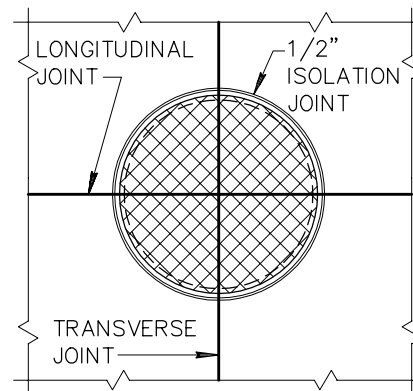
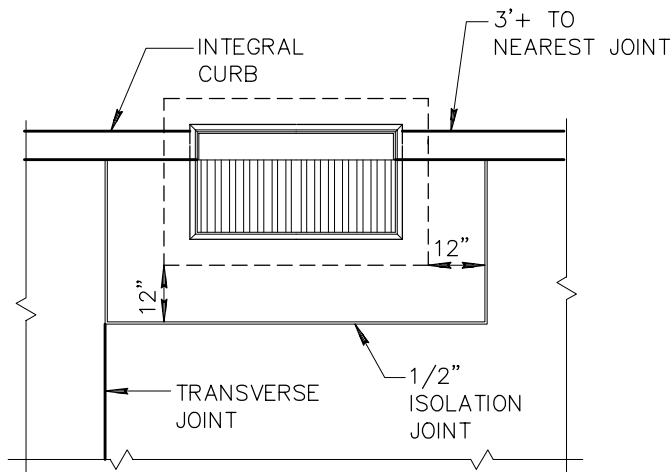
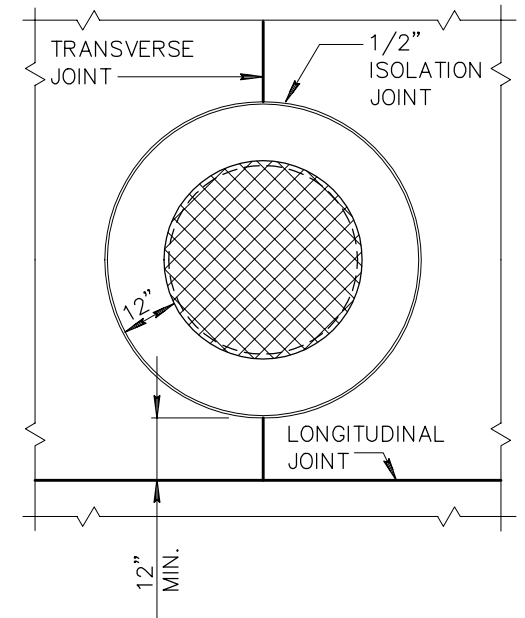
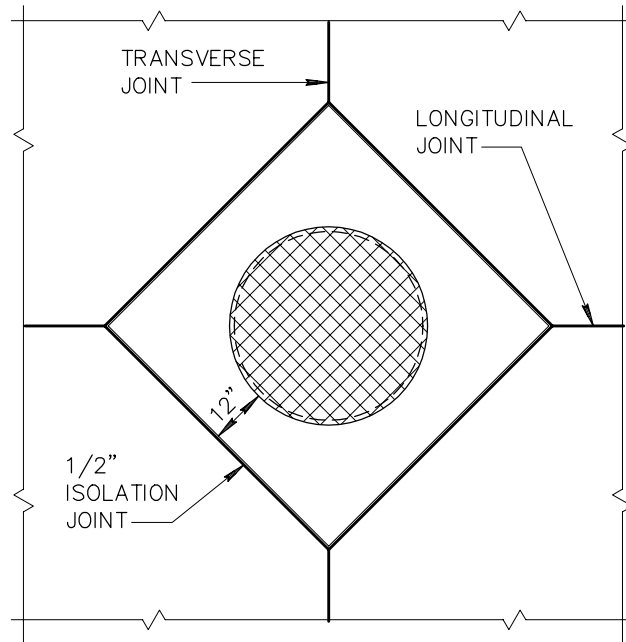
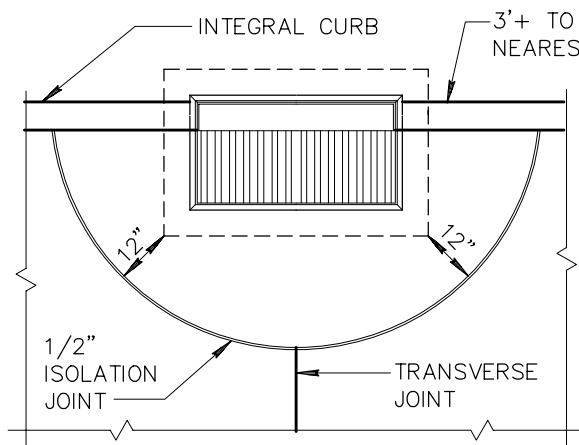
01-03-2002

DETAIL NO.

222



NOTE:
 LENGTH OF TRANSITION SHALL BE
 EQUAL TO RADIUS OF MEDIAN NOSE,
 (5' MINIMUM). FOR LOCATION
 SEE PLANS.



DRAINAGE INLET

MANHOLE COVERS

MANHOLE COVERS

DETAIL NO.

224



STANDARD DETAIL
ENGLISH

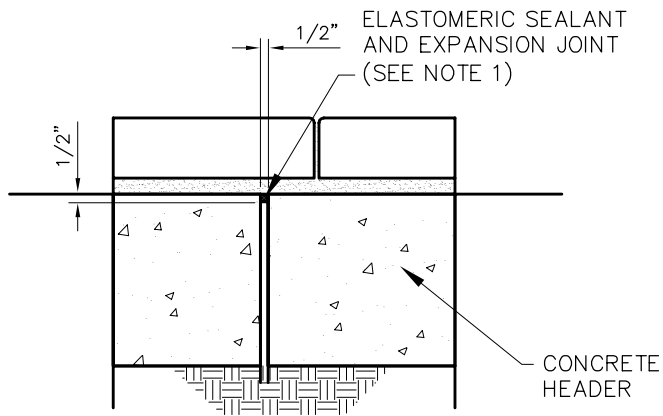
JOINT FOR DRAINAGE INLETS
AND MANHOLE COVERS

REVISED

DETAIL NO.

224

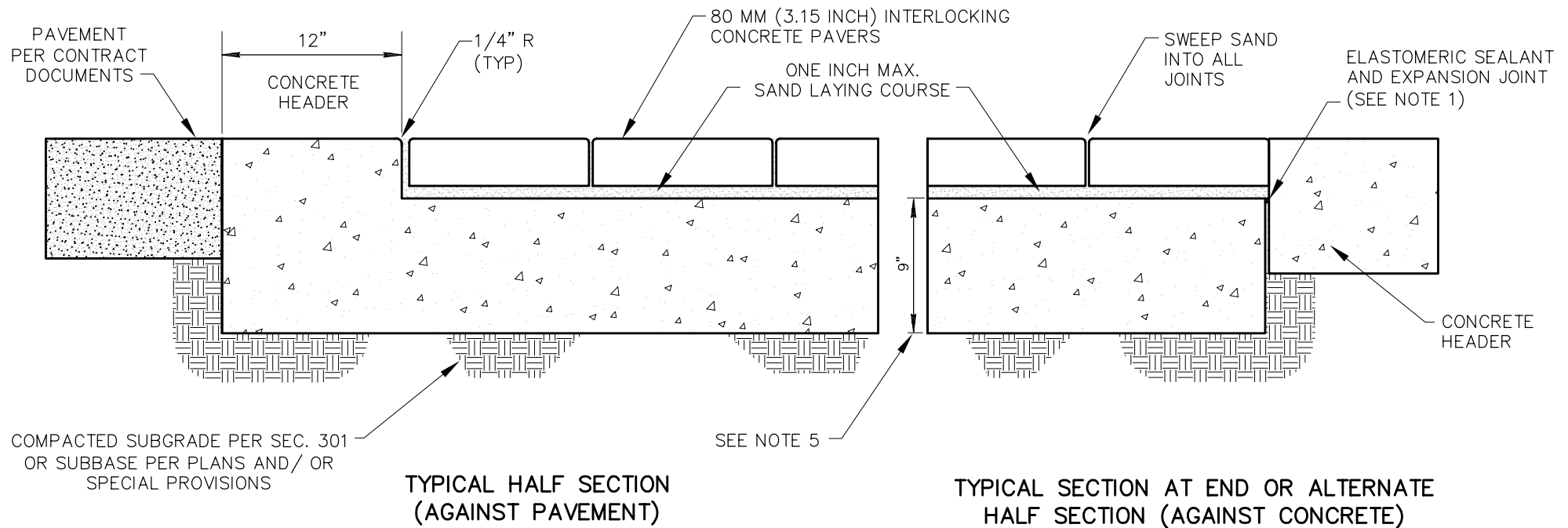
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EXPANSION JOINT DETAIL

NOTES:

1. 1/2 INCH EXPANSION JOINT, ASTM D-1751 PER SEC. 729 AND ELASTOMERIC SEALANT PER SEC. 342
2. CONTRACTION JOINTS PER SEC. 342
3. MATERIALS AND CONSTRUCTION PER SEC. 342
4. PORTLAND CEMENT CONCRETE SHALL BE CLASS A
5. DESIGN PARAMETERS FOR THE THICKNESS IS BASED ON:
ASSUMES MODULUS OF SUBGRADE REACTION (K) = 100 pci
CONCRETE WORKING STRESS (f_1) = 300 psi
TERMINAL SERVICABILITY INDEX (p_1) OF 2.5 OVER 20 YEARS
AND 1 MILLION TOTAL EQUIVALENT 18-KIP SINGLE-AXLE
LOAD APPLICATIONS



DETAIL NO.

225



STANDARD DETAIL
ENGLISH

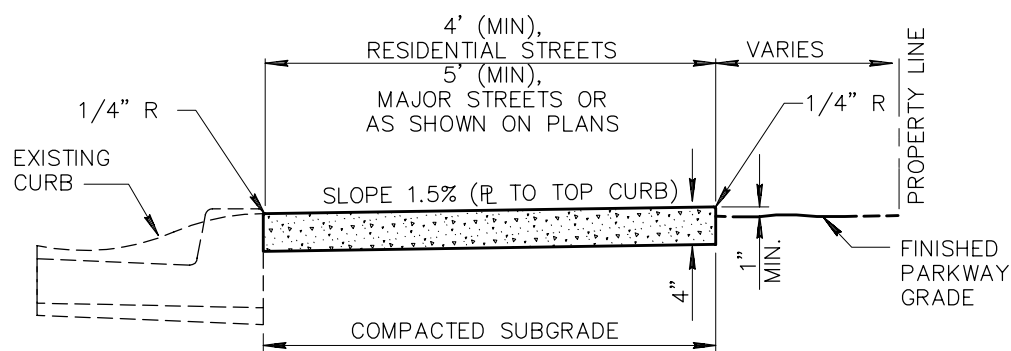
CONCRETE PAVERS

REVISED

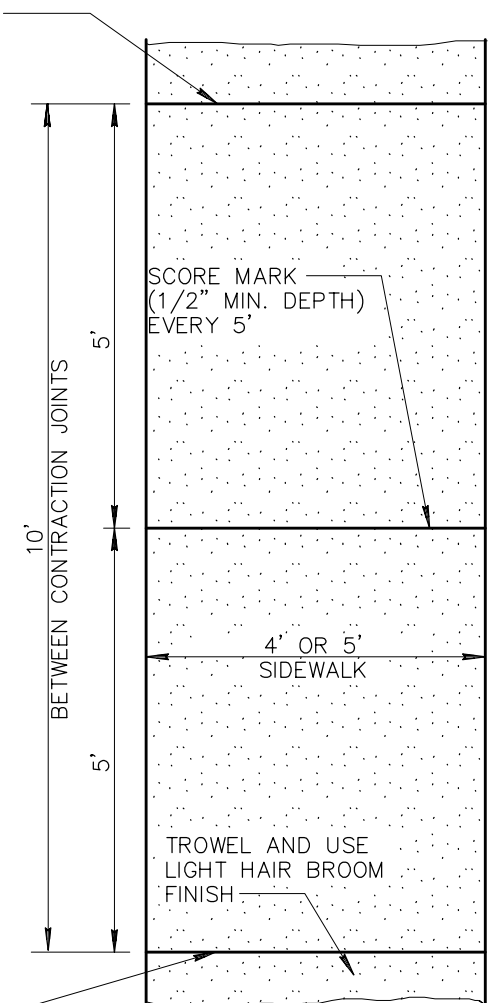
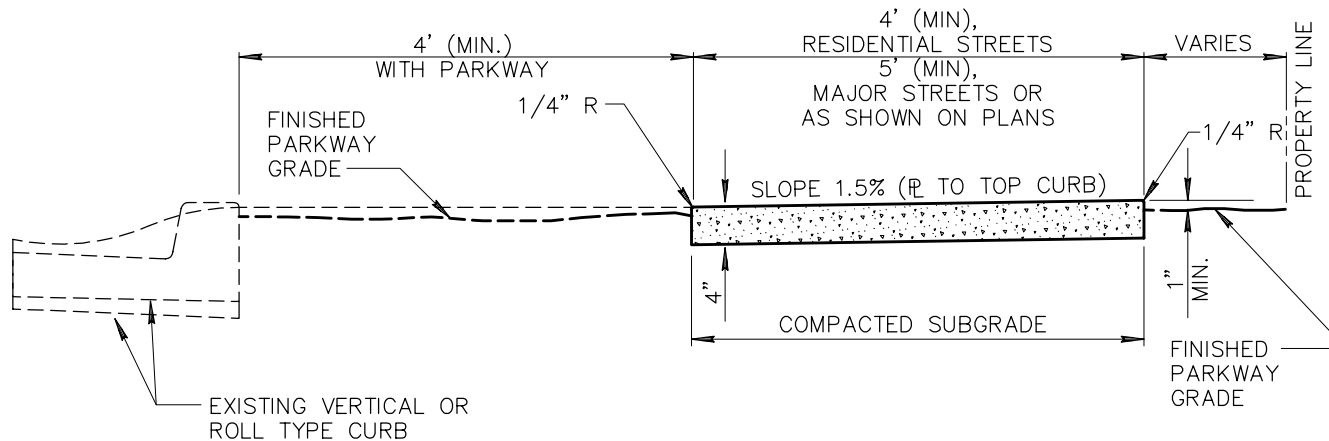
01-01-2005

DETAIL NO.

225

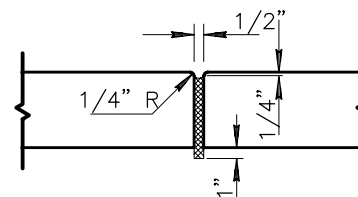


CURB AND GUTTER
CONTRACTION JOINT
SHALL MATCH
SIDEWALK JOINT

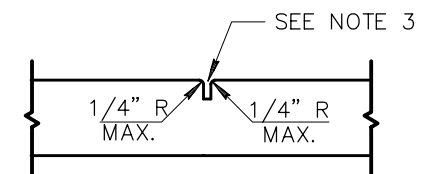


NOTES:

1. SIDEWALK CONSTRUCTION SHALL CONFORM TO SECT. 340.
2. EXPANSION JOINTS SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, A.S.T.M. D-1751.
3. LARGE AGGREGATE, IN CONTRACTION JOINT, SHALL BE SEPARATED TO A DEPTH OF 1", FINISH DEPTH SHALL BE A MINIMUM OF 3/4".
4. EXPANSION JOINT 50' MAXIMUM SPACING PER SECT. 340.
5. CLASS 'B' CONCRETE CONSTRUCTION AS PER SECT. 725.



EXPANSION JOINT



CONTRACTION JOINT

DETAIL NO.

230



STANDARD DETAIL
ENGLISH

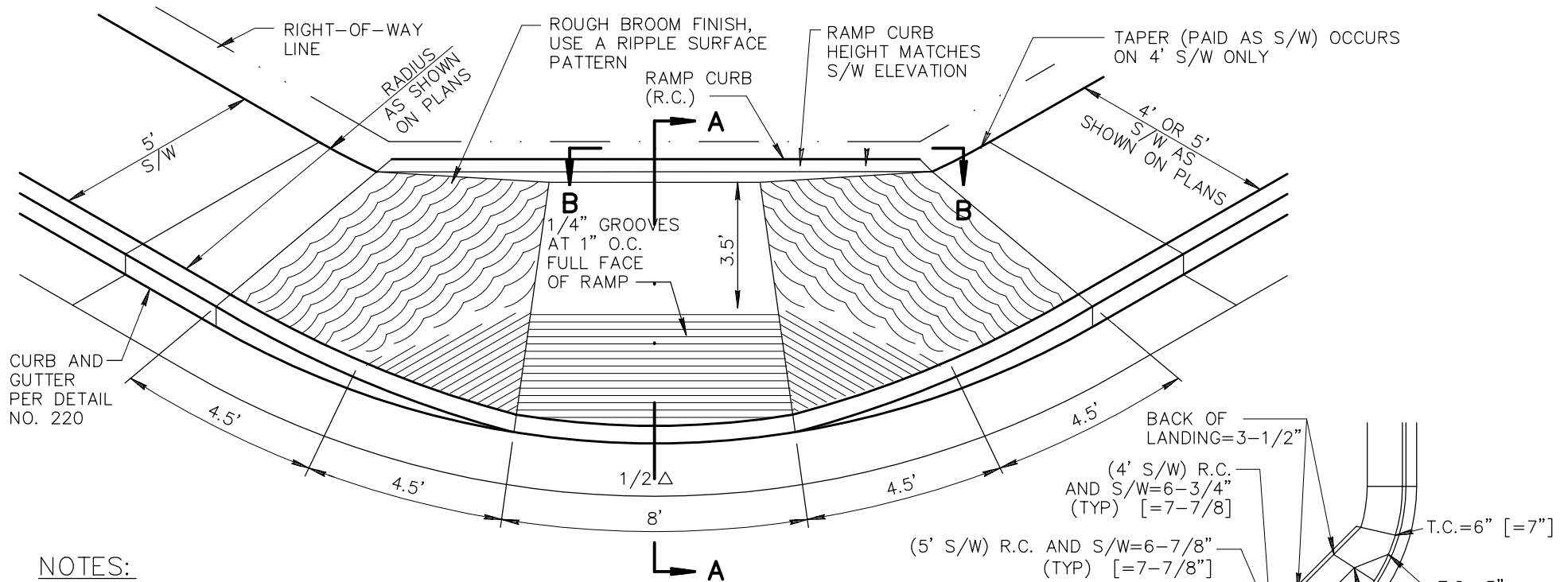
SIDEWALKS

REVISED

01-01-2003

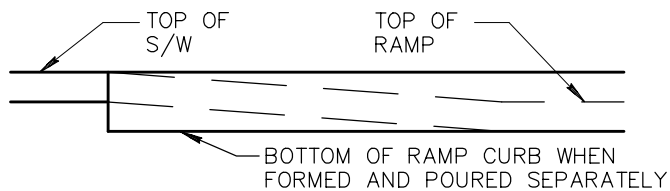
DETAIL NO.

230

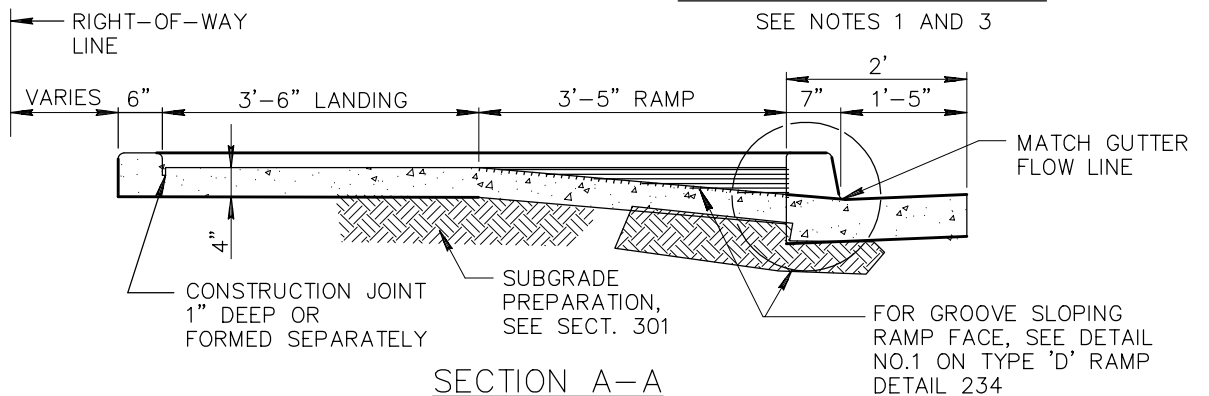


NOTES:

1. CONTROL ELEVATIONS SHOWN ARE IN RELATION TO THE GUTTER AND ARE LOCATED RADIALLY. GUTTER ELEVATION=0.
2. CLASS 'B' CONCRETE CONSTRUCTION AS PER SECTION 725.
3. WHEN CURB HEIGHTS OF 7" ARE SHOWN ON PLANS, USE DIMENSIONS SHOWN IN []'S.



SECTION B-B



CONTROL ELEVATIONS

SEE NOTES 1 AND 3

DETAIL NO.

231



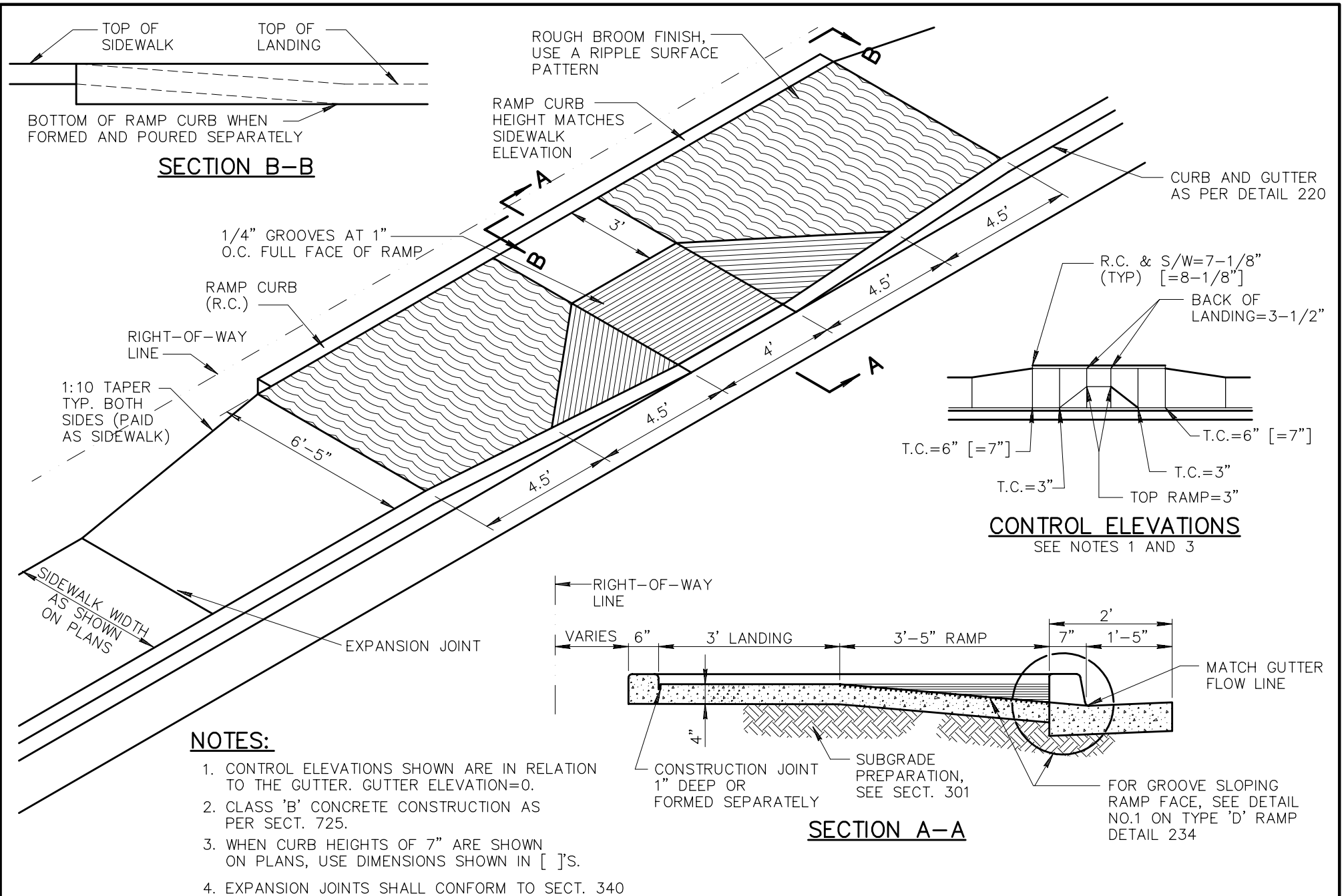
STANDARD DETAIL
ENGLISH

SIDEWALK RAMPS – TYPE 'A'

REVISED

DETAIL NO.

231



DETAIL NO.

233



STANDARD DETAIL
ENGLISH

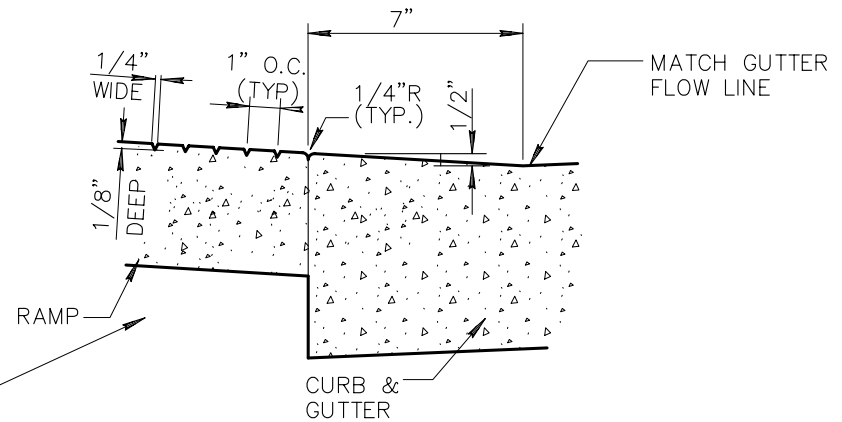
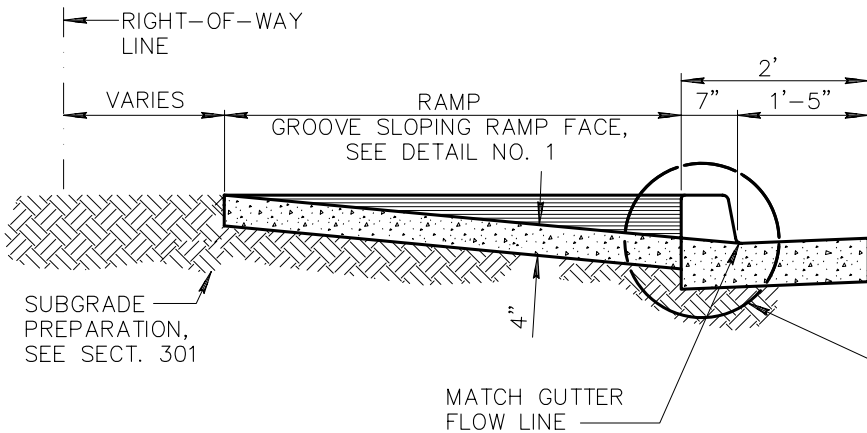
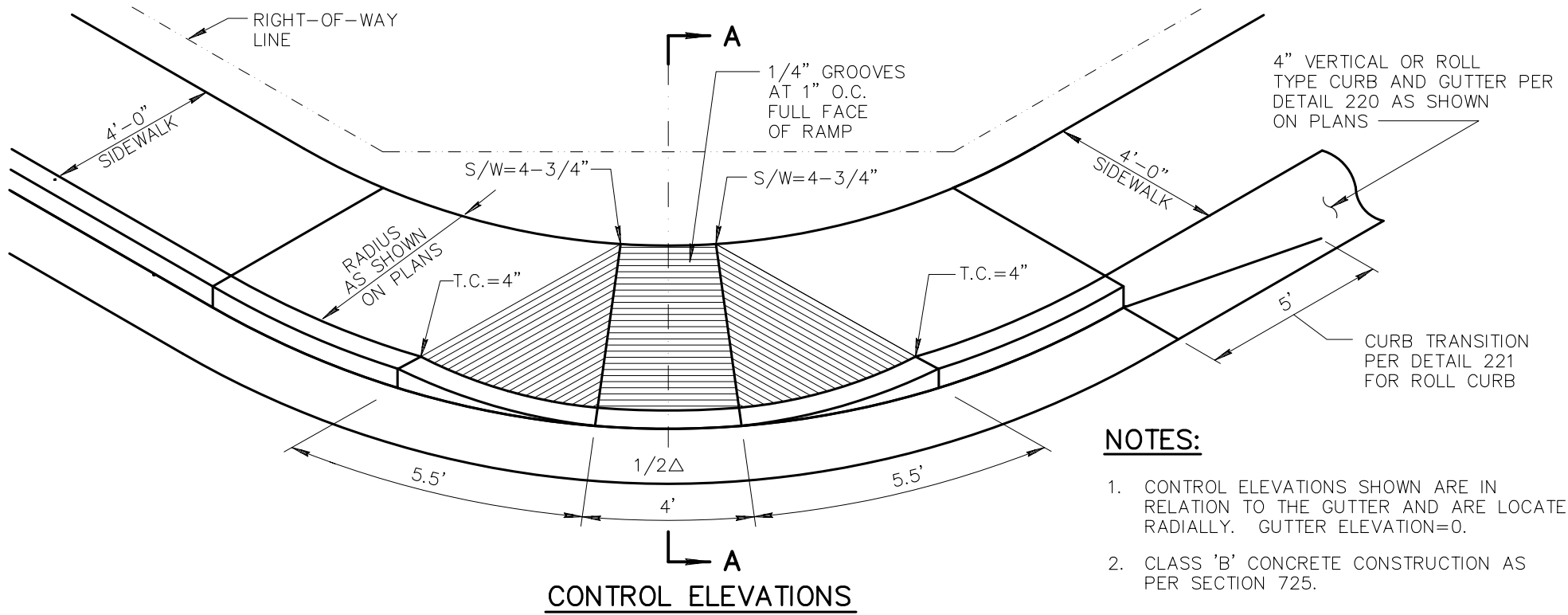
SIDEWALK RAMPS - TYPE 'C'

REVISED

01-01-2003

DETAIL NO.

233



DETAIL NO.

234



MARICOPA
ASSOCIATION of
GOVERNMENTS

STANDARD DETAIL
ENGLISH

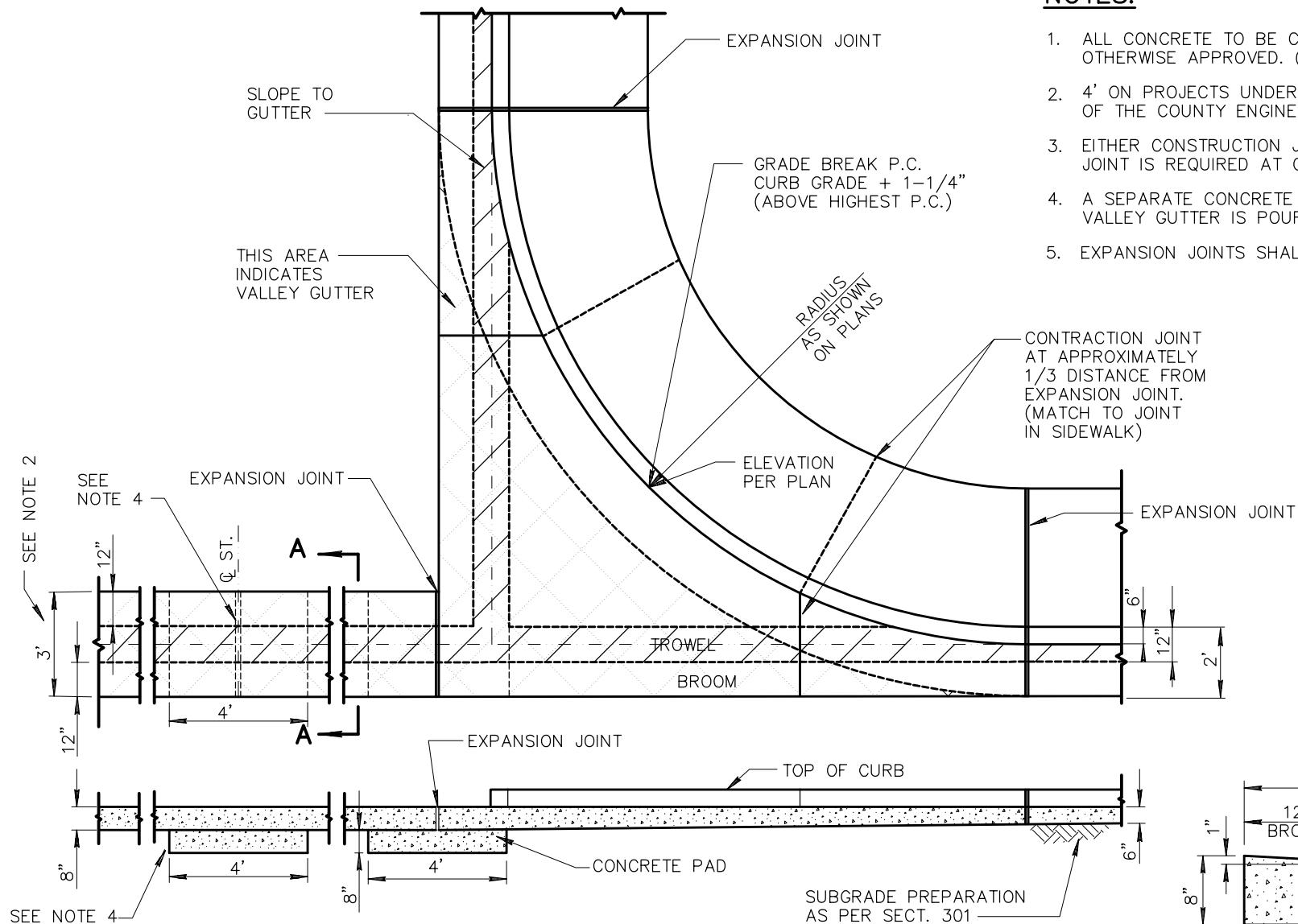
SIDEWALK RAMPS - TYPE 'D'

REVISED

01-03-2002

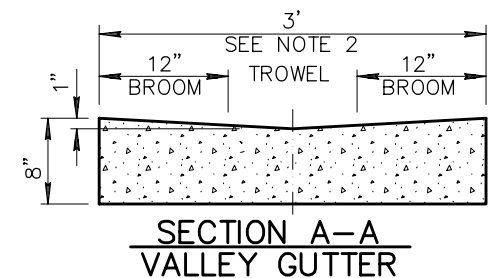
DETAIL NO.

234



NOTES:

1. ALL CONCRETE TO BE CLASS 'A' UNLESS OTHERWISE APPROVED. (SECT. 725).
2. 4' ON PROJECTS UNDER THE JURISDICTION OF THE COUNTY ENGINEER AND THE CITY OF MESA.
3. EITHER CONSTRUCTION JOINT OR CONTRACTION JOINT IS REQUIRED AT CENTERLINE OF STREET.
4. A SEPARATE CONCRETE PAD IS REQUIRED WHEN VALLEY GUTTER IS POURED HALF AT A TIME.
5. EXPANSION JOINTS SHALL CONFORM TO SECT. 340.



DETAIL NO.

240



STANDARD DETAIL
ENGLISH

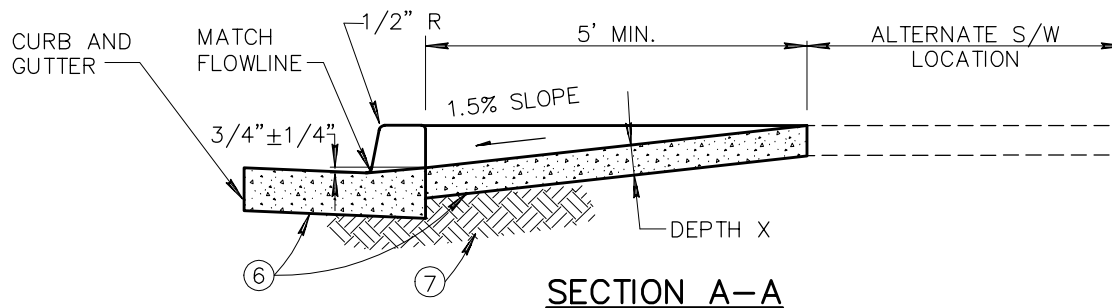
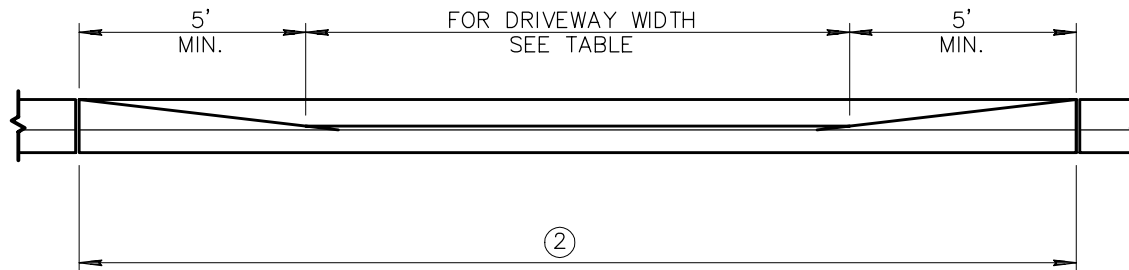
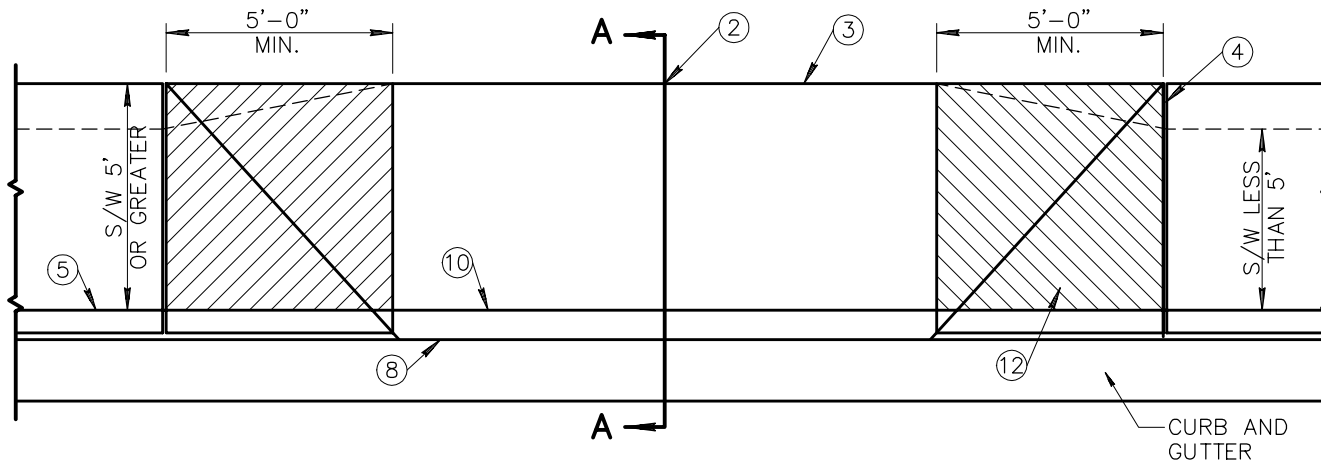
VALLEY GUTTER

REVISED

01-01-2003

DETAIL NO.

240



NOTES:

- DEPRESSED CURB SHALL BE PAID FOR AT THE UNIT PRICE BID FOR THE TYPE OF CURB USED AT THAT LOCATION.
- WHEN WIDTH EXCEEDS 22' PROVIDE A CONTRACTION JOINT ON D/W CENTERLINE.
- BACK OF D/W OR FACE OF FUTURE S/W.
- EXPANSION JOINTS SHALL COMPLY WITH SECTION 340.
- BACK OF CURB – CONSTRUCTION JOINT OR SCORE MARK.
- CLASS 'B' CONCRETE, SECT. 725.
- SUBGRADE PREPARATION, SECT. 301.
- FLOW LINE OF GUTTER.
- DEPRESSED CURB.
- SECT. A-A AND ELEVATION, D/W VERTICAL CURB AND GUTTER OR ROLL TYPE CURB AND GUTTER.
- ROLL TYPE CURB AND GUTTER NOT PERMITTED IN THE CITY OF MESA
- 1/4" GROOVES AT 1" O.C. FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF DRIVEWAY. SEE DETAIL NO. 1 ON TYPE 'D' RAMP DETAIL NO. 234.

COMMERCIAL AND INDUSTRIAL

DRIVEWAY WIDTH	MIN.	MAX.	CLASS	DEPTH ^x
COMMERCIAL	* 16'	40'	B	6"
INDUSTRIAL	* 16'	40'	B	6"
*24' MIN. FOR TWO WAY TRAFFIC				

RESIDENTIAL

DRIVEWAY WIDTH	MIN.	MAX.	CLASS	DEPTH ^x
MAJOR STREET	16'	30'	B	5"
COLLECTOR STREET	* 12'	30'	B	5"
LOCAL STREET	12'	30'	B	5"
*16' DESIRABLE				

DETAIL NO.

250



**STANDARD DETAIL
ENGLISH**

DRIVEWAY ENTRANCES

REVISED
01-01-2005

DETAIL NO.

250

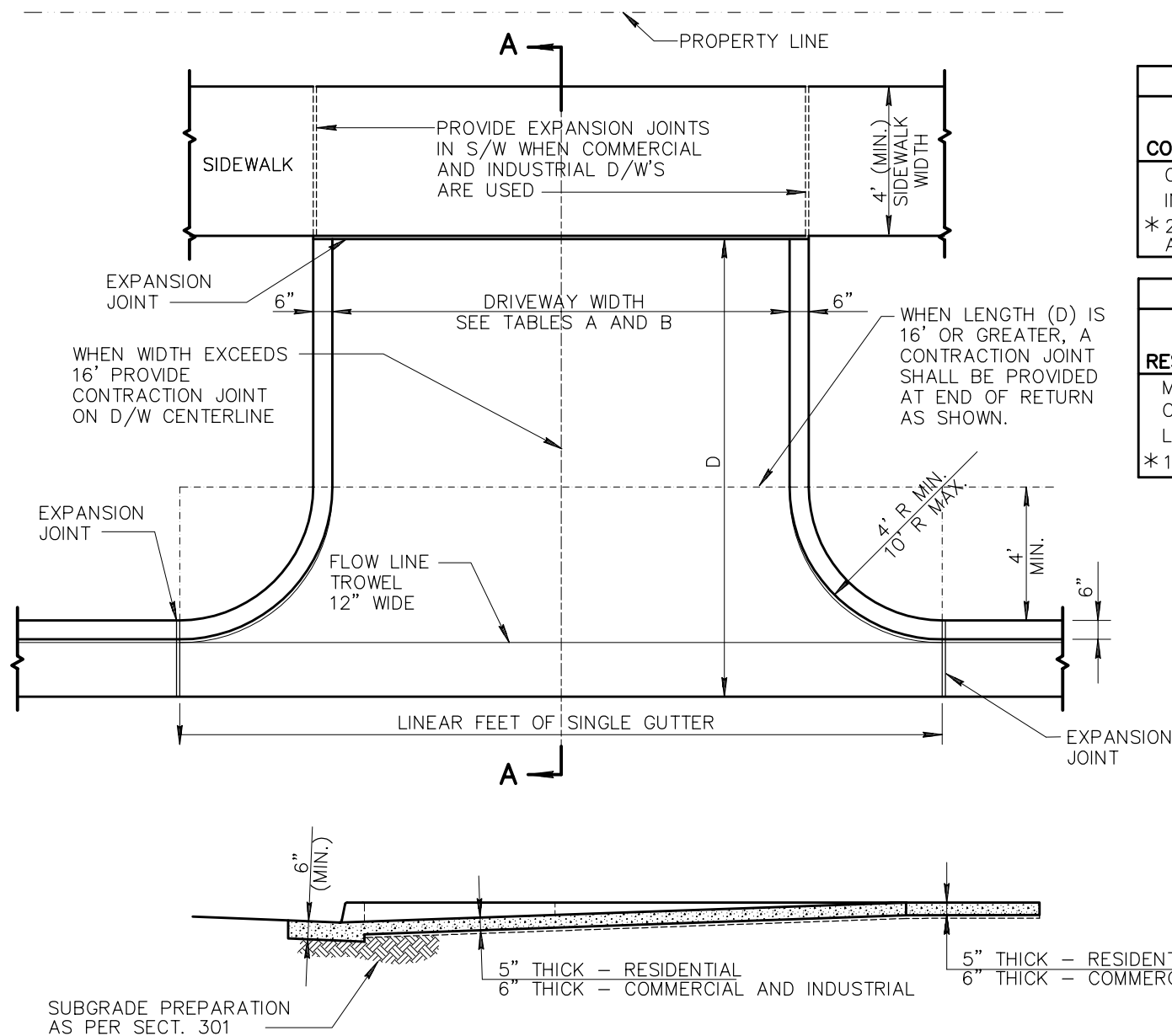


TABLE A		
ZONING	DRIVEWAY WIDTH	
	MIN.*	MAX.
COMMERCIAL AND INDUSTRIAL		
COMMERCIAL	16'	40'
INDUSTRIAL	16'	40'
* 24' WHERE 2-WAY TRAFFIC IS ANTICIPATED		

TABLE B		
ZONING	DRIVEWAY WIDTH	
	MIN.*	MAX.
RESIDENTIAL		
MAJOR STREET	16'	30'
COLLECTOR STREET	12'	30'
LOCAL STREET	12'	30'
* 16' WIDTH IS DESIRABLE		

NOTES:

1. EXPANSION JOINTS SHALL COMPLY TO SECTION 340.
2. THIS TYPE D/W TO BE USED ONLY UPON APPROVAL OF ENGINEER.
3. CLASS 'B' CONCRETE CONSTRUCTION AS PER SECT. 725

DETAIL NO.

251



**STANDARD DETAIL
ENGLISH**

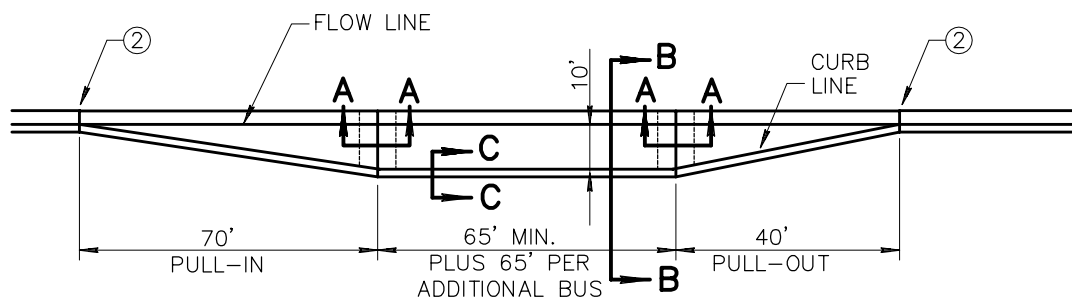
RETURN TYPE DRIVEWAYS

REVISED

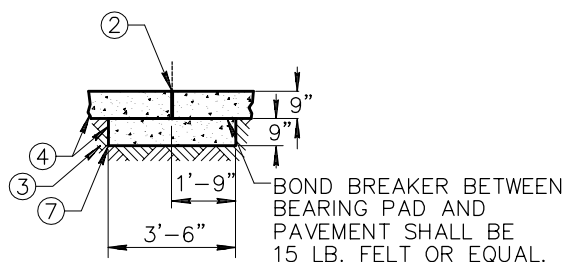
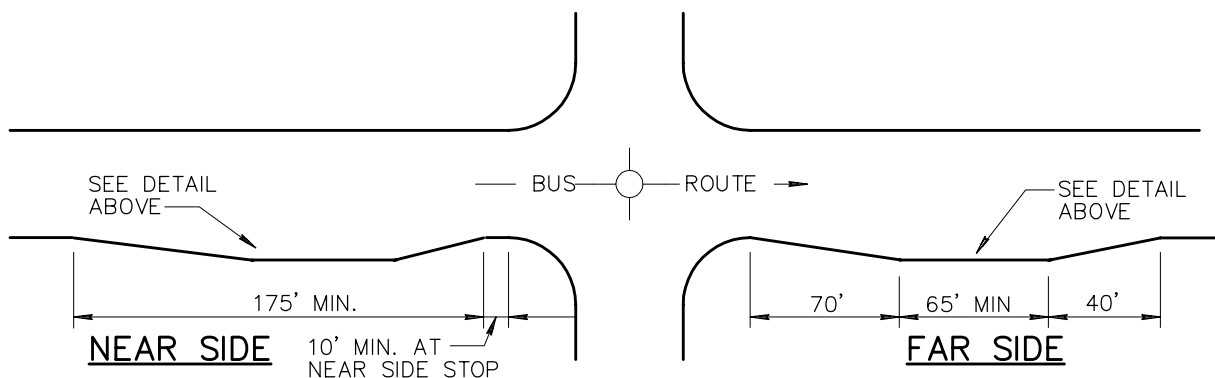
01-01-2003

DETAIL NO.

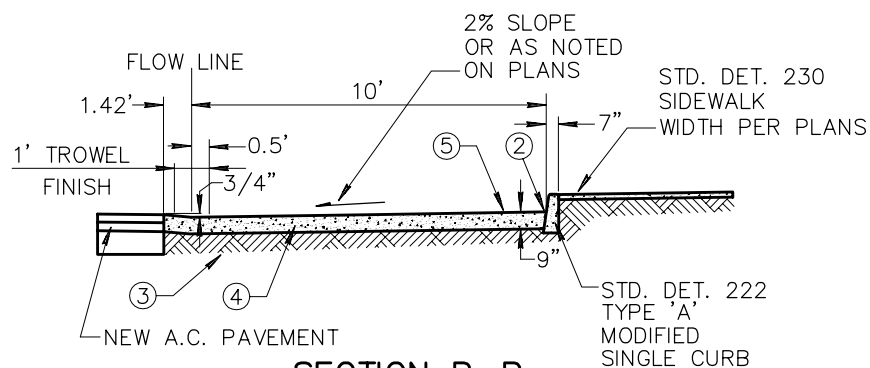
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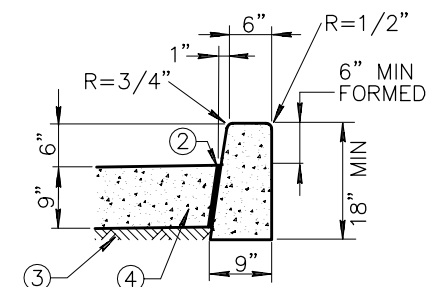
DETAIL



SECTION A-A



SECTION B-B



SECTION C-C

STD. DET. 222 TYPE 'A' MODIFIED SINGLE CURB

NOTES:

1. SUFFICIENT RIGHT-OF-WAY MUST BE AVAILABLE TO CONSTRUCT THE BUS BAY.
2. 1/2" BITUMINOUS PREFORMED EXPANSION JOINT FILLER ASTM D-1751 PER SPECIFICATION SECTION 729.
3. SUBGRADE PREPARATION PER SPECIFICATION SECTION 301 COMPACTED TO 95% MINIMUM DENSITY.
4. CONCRETE SHALL BE CLASS 'A' PER SPECIFICATION SECTION 725.
5. CONCRETE BUS BAY PAVEMENT SHALL BE BROOM FINISHED, EXCEPT WHERE OTHERWISE NOTED.
6. CONTRACTION JOINTS IN THE BUS BAY PAVEMENT SHALL MATCH THOSE IN THE CURB, 15 FT. MAXIMUM SPACING.
7. CONCRETE BEARING PAD (SECTION A-A) TO BE POURED SEPARATELY FROM CONCRETE BUS BAY PAVEMENT.

DETAIL NO.

252



**STANDARD DETAIL
ENGLISH**

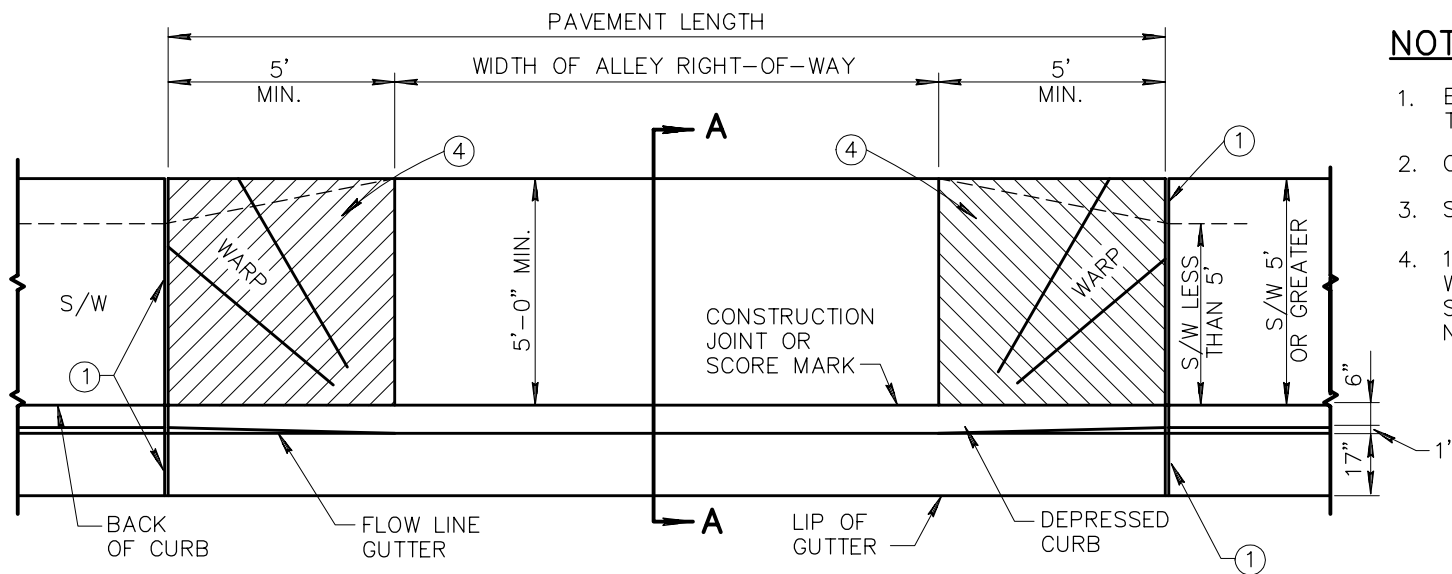
BUS BAYS

REVISED

01-01-2005

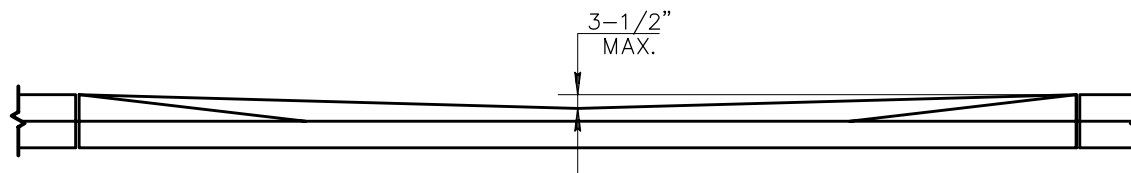
DETAIL NO.

252

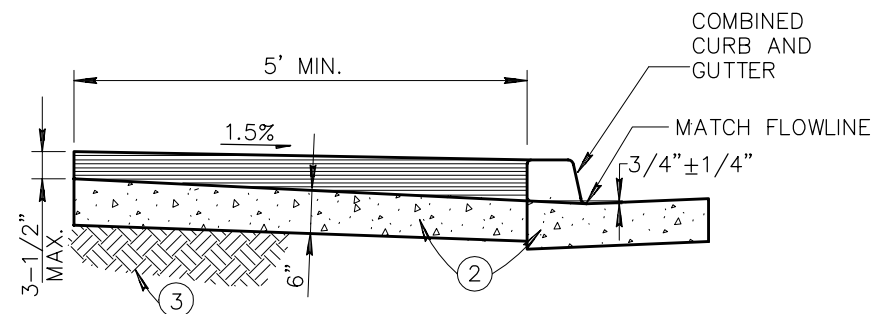


NOTES:

1. EXPANSION JOINTS SHALL CONFORM TO SECTION 340.
2. CLASS 'B' CONCRETE, PER SECT. 725.
3. SUBGRADE PREPARATION, PER SECT. 301.
4. 1/4" GROOVES AT 1" O.C. FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF ALLEY ENTRANCE. SEE DETAIL NO. 1 ON TYPE 'D' RAMP DETAIL NO. 234.



ELEVATION



SECTION A-A

DETAIL NO.

260



**STANDARD DETAIL
ENGLISH**

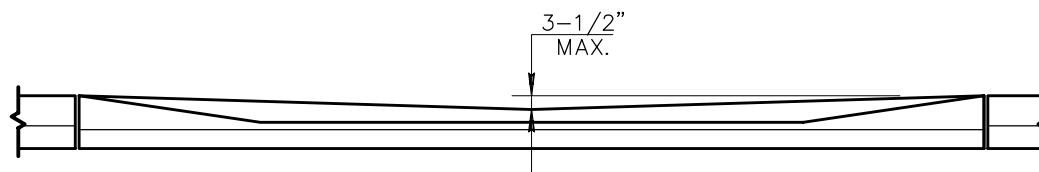
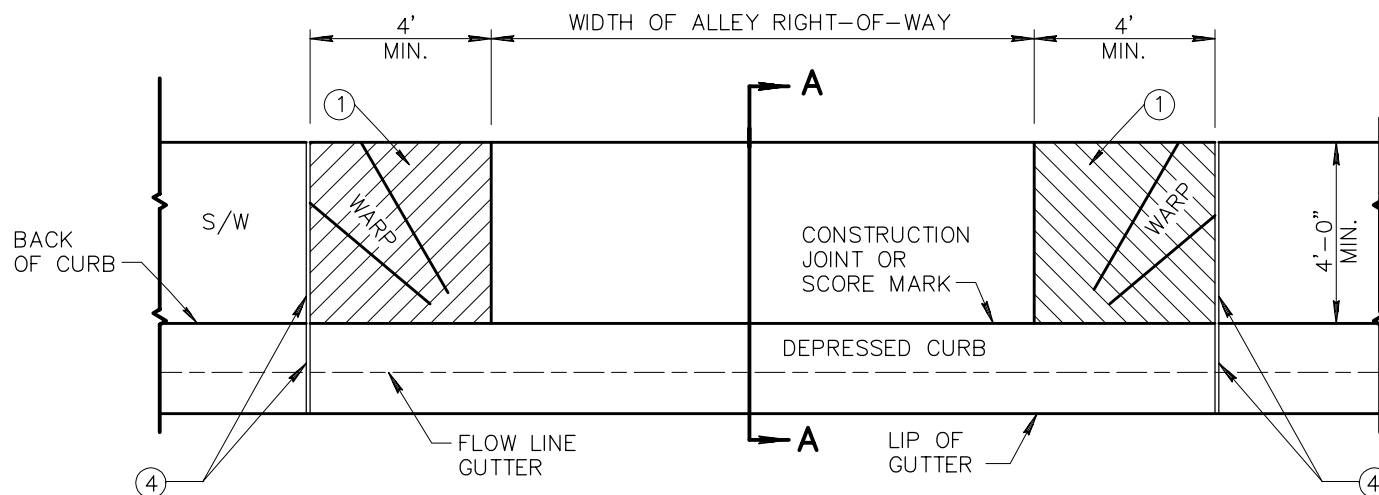
**ALLEY ENTRANCE
(WITH COMBINED CURB AND GUTTER)**

REVISED

01-01-2005

DETAIL NO.

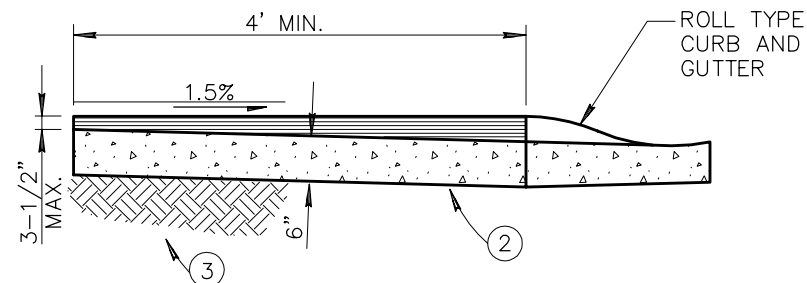
260



ELEVATION

NOTES:

1. 1/4" GROOVES AT 1" O.C. FULL WIDTH OF 4' WARP SECTION, EACH SIDE OF ALLEY ENTRANCE. SEE DETAIL NO. 1 ON TYPE 'D' RAMP DETAIL 234.
2. CLASS 'B' CONCRETE CONSTRUCTION PER SECT. 725.
3. SUBGRADE PREPARATION, PER SECT. 301.
4. EXPANSION JOINTS SHALL CONFORM TO SECT. 340.



SECTION A-A

DETAIL NO.

261



**STANDARD DETAIL
ENGLISH**

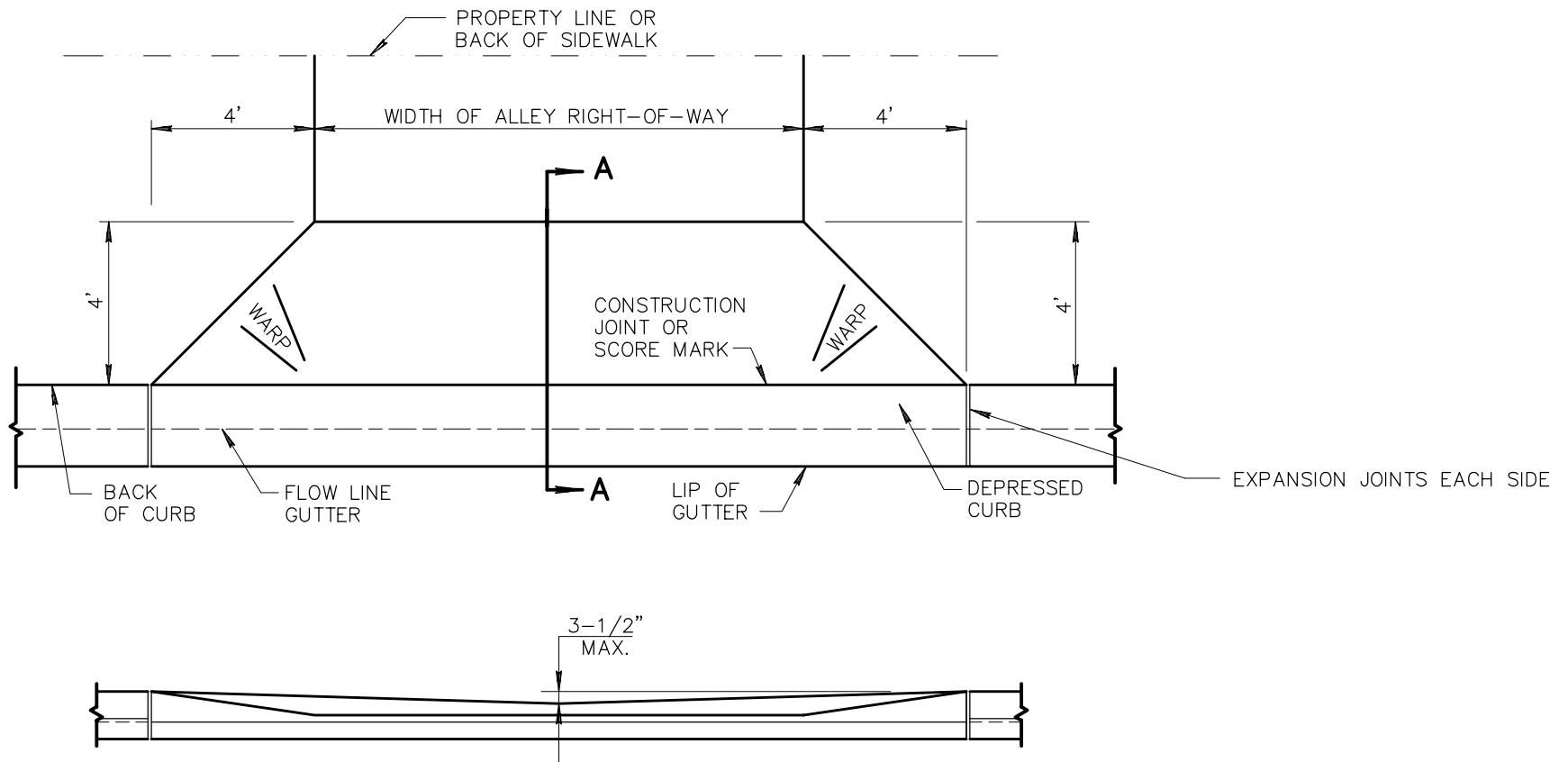
**ALLEY ENTRANCE
(WITH ROLL TYPE CURB AND GUTTER)**

REVISED

01-01-2003

DETAIL NO.

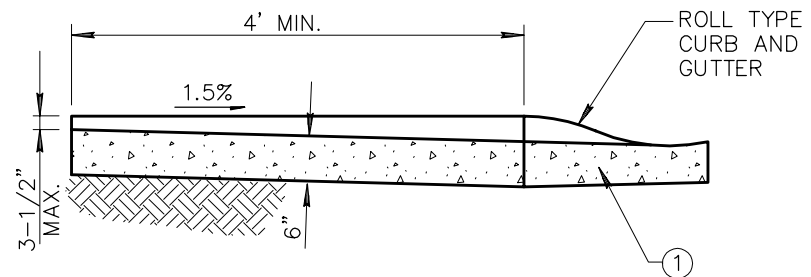
261



ELEVATION

NOTES:

1. CLASS 'B' CONCRETE CONSTRUCTION PER SECT. 725.
2. EXPANSION JOINTS SHALL CONFORM TO SECT. 340.
3. SUBGRADE PREPARATION PER SECTION 301.



SECTION A-A

DETAIL NO.

263



**STANDARD DETAIL
ENGLISH**

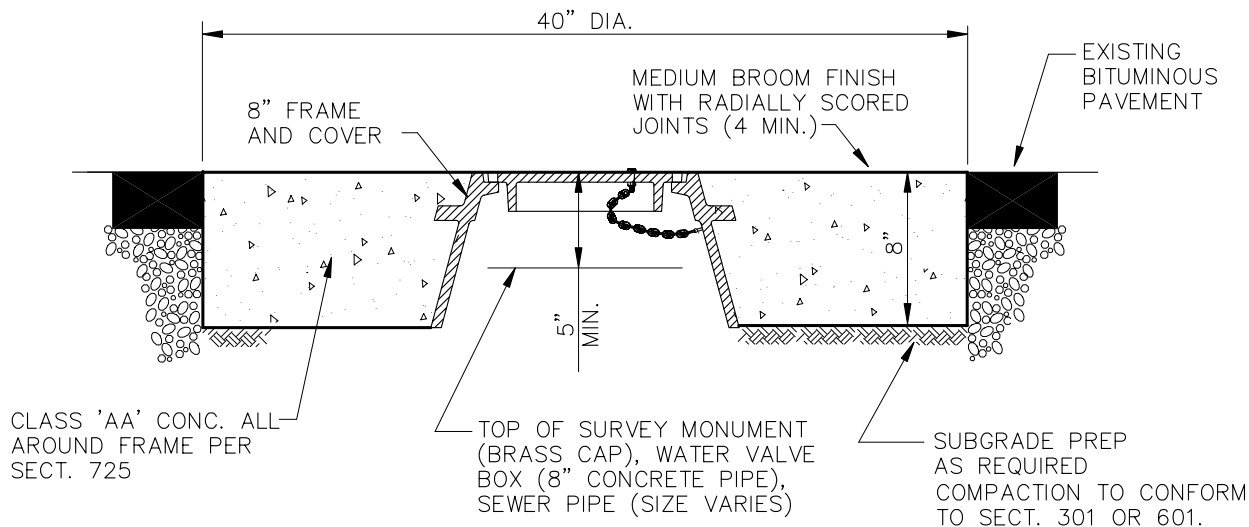
**WING TYPE ALLEY ENTRANCE
(WITH ROLL TYPE CURB AND GUTTER)**

REVISED

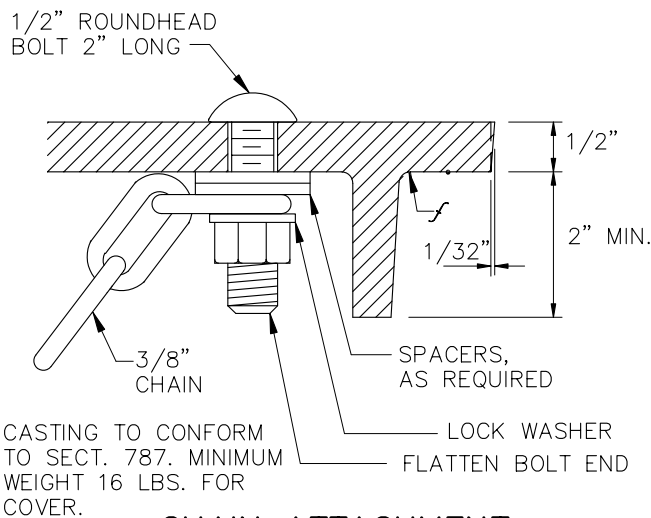
01-01-2002

DETAIL NO.

263

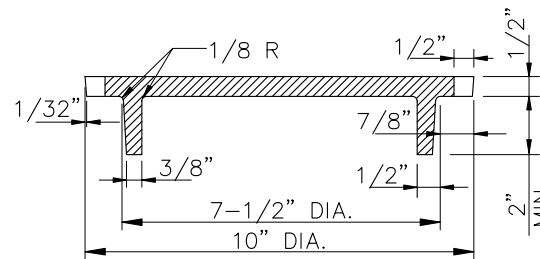


WATER VALVE, SURVEY MONUMENT, OR SEWER CLEAN OUT FRAME & GRADE ADJUSTMENT



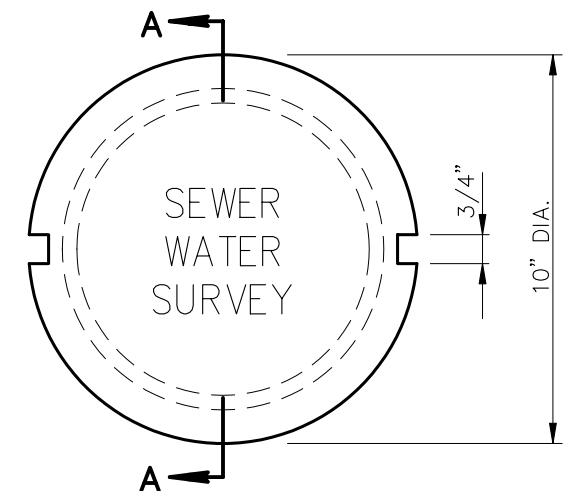
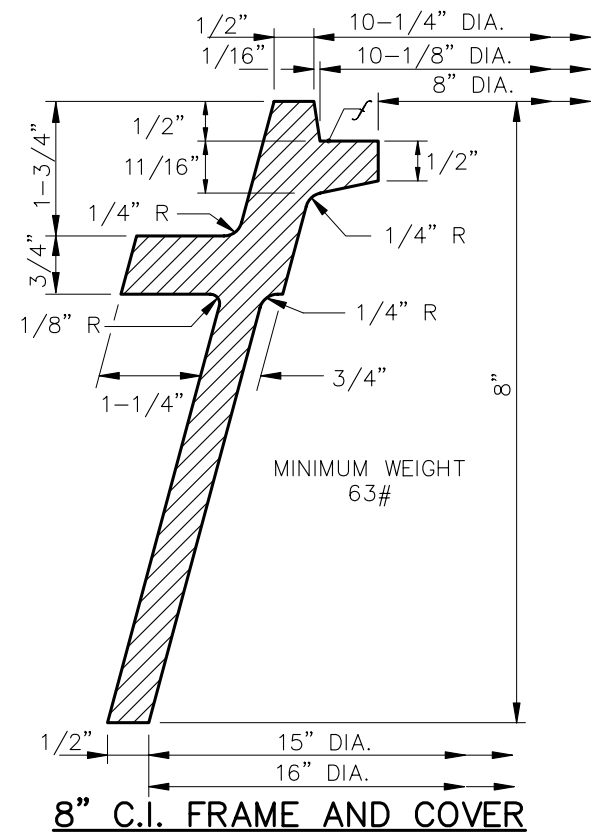
CHAIN ATTACHMENT (AS REQUIRED)

LETTERS ON COVER TO BE AS FOLLOWS:
"SEWER", "WATER", OR "SURVEY" AS DIRECTED
TOTAL WIDTH OF WORD "SEWER" OR "WATER"
3-3/4". TOTAL WIDTH OF WORD "SURVEY"
4-1/2". LETTER SIZE 5/8" x 3/4", RAISED 1/16"
ABOVE LEVEL OF COVER, TYPE OF LETTERS
TO BE SUBMITTED FOR APPROVAL.



COVER SECTION A-A

DETAIL TYPICAL
FOR BOTH FRAME
AND COVER



DETAIL NO.

270



STANDARD DETAIL
ENGLISH

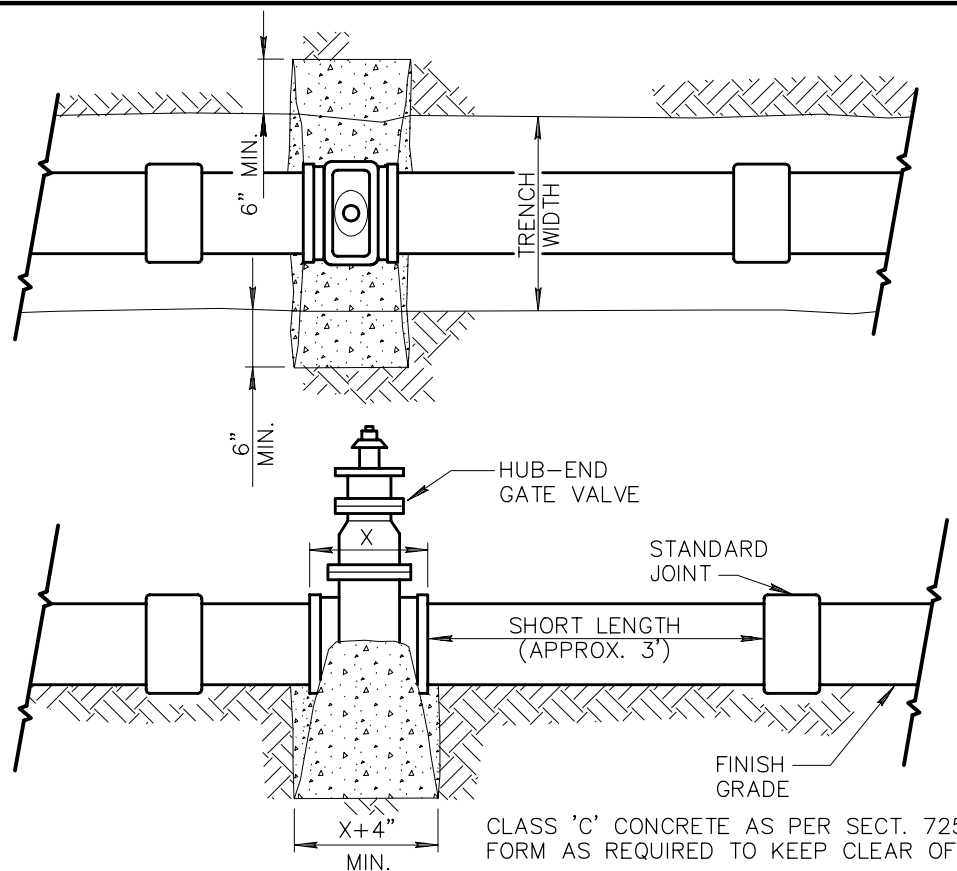
FRAME AND COVER

REVISED

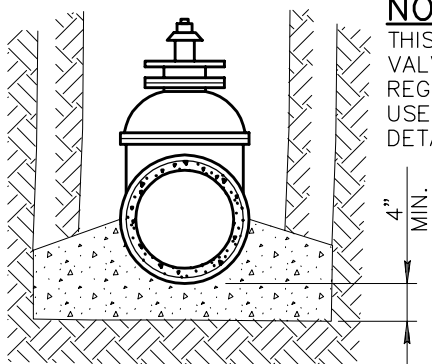
01-03-2002

DETAIL NO.

270



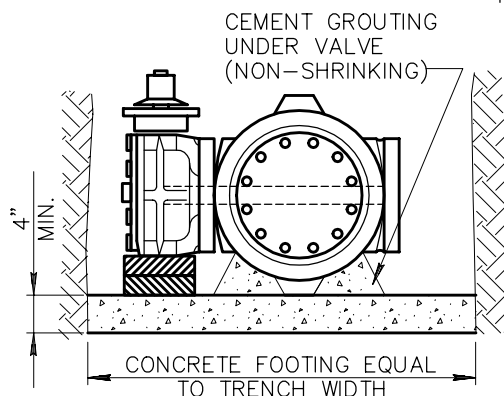
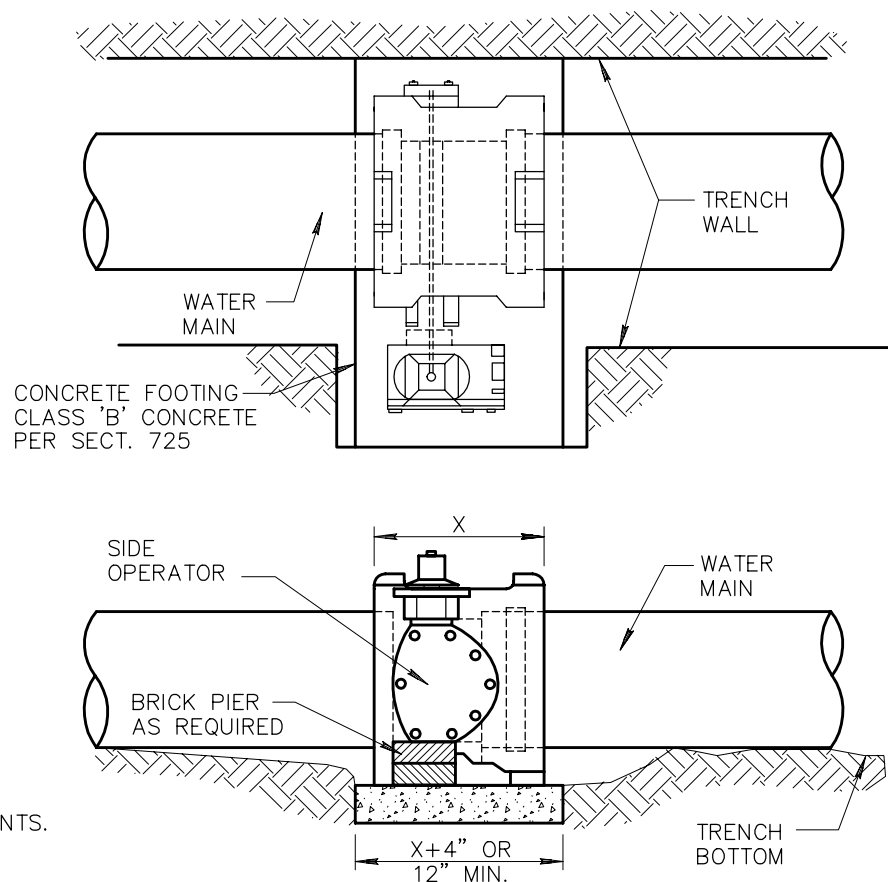
CLASS 'C' CONCRETE AS PER SECT. 725
FORM AS REQUIRED TO KEEP CLEAR OF JOINTS.



WATER GATE VALVE

NOTE:

THIS DETAIL COVERS WATER GATE VALVES, 4" TO 12" INCLUSIVE REGARDLESS OF TYPE OF PIPE USED. LARGER LINES TO BE DETAILED ON PLANS.



BUTTERFLY VALVE

NOTES:

1. THIS DETAIL COVERS BUTTERFLY VALVE INSTALLATION, 3" TO 12" INCLUSIVE, REGARDLESS OF TYPE OF PIPE OR JOINT USED. LARGER LINES TO BE DETAILED ON PLANS.
2. VALVE BOX AND COVER REQUIRED PER DETAILS 270 AND 391.

DETAIL NO.

301



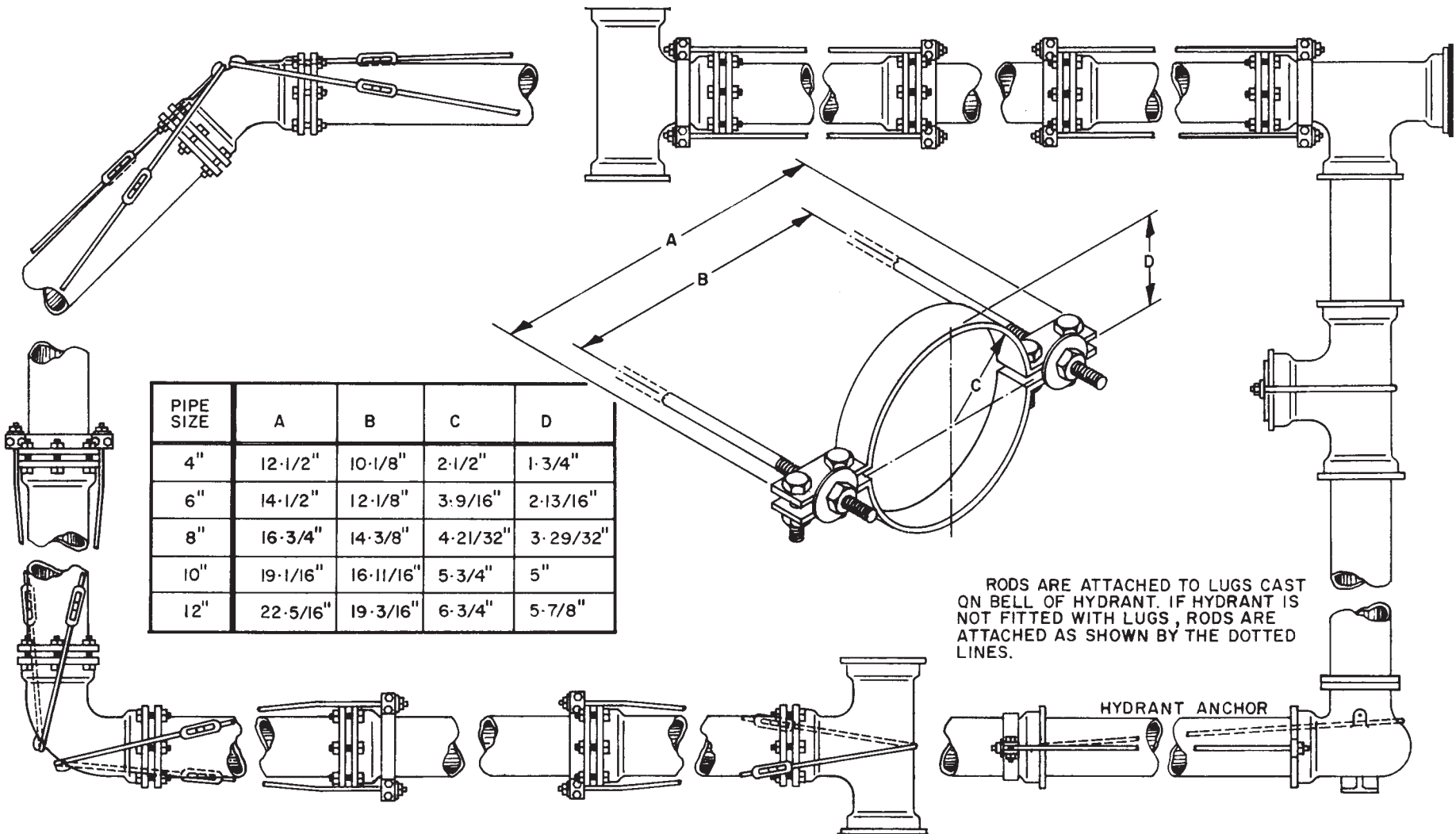
STANDARD DETAIL
ENGLISH

BLOCKING FOR
WATER GATE AND BUTTERFLY VALVES

REVISED

DETAIL NO.

301



SHEET 1 OF 2

DETAIL NO.

302-1



STANDARD DETAIL
ENGLISH

JOINT RESTRAINT WITH TIE RODS

REVISED

DETAIL NO.

302-1

THIS DETAIL IS FOR USE ONLY ON UNDERGROUND INSTALLATIONS WHERE THE USE OF CONCRETE THRUST BLOCKING PER DETAIL 380 CANNOT BE USED BECAUSE OF OBSTRUCTIONS, OR REQUIREMENTS OF THE SPECIFICATIONS...

- * CLAMPS SHALL BE 1/2 BY 2 INCHES FOR PIPE 4 AND 6 INCHES IN DIAMETER; 5/8 BY 2-1/2 INCHES FOR PIPE 8 AND 10 INCHES; 5/8 BY 3 INCHES FOR PIPE 12 INCHES. BOLT HOLES SHALL BE 1/16 INCH IN DIAMETER LARGER THAN BOLTS.
- * RODS SHALL BE 3/4 INCHES IN DIAMETER FOR PIPES 4, 6 AND 8 INCHES IN DIAMETER; 7/8 INCHES FOR PIPE 10 INCHES AND 1 INCH IN DIAMETER FOR PIPE 12 INCHES.
- * BOLTS SHALL BE 5/8 INCHES IN DIAMETER FOR PIPE 4, 6 AND 8 INCHES IN DIAMETER; 3/4 INCHES FOR PIPE 10 INCHES AND 7/8 INCHES IN DIAMETER FOR PIPE 12 INCHES
- * WASHERS MAY BE CAST IRON OR STEEL, ROUND OR SQUARE, DIMENSIONS FOR CAST IRON WASHERS ARE 5/8 BY 3 INCHES FOR PIPE 4, 6, 8 AND 10 INCHES IN DIAMETER AND 3/4 BY 3-1/2 INCHES FOR PIPE 12 INCHES. DIMENSIONS FOR STEEL WASHERS ARE 1/2 BY 3 INCHES FOR PIPE 4, 6, 8 AND 10 INCHES IN DIAMETER AND 1/2 BY 3-1/2 INCHES FOR PIPE 12 INCHES IN DIAMETER. HOLES SHALL BE 1/8 INCH LARGER THAN THE RODS.

FOR PIPE LARGER THAN 12 INCHES IN DIAMETER, RESTRAINT DETAILS SHALL BE SUBMITTED FOR APPROVAL PRIOR TO INSTALLATION.

1. ALL TIE RODS, ROD COUPLINGS, TURNBUCKLES, BOLTS AND NUTS FOR THESE JOINTS SHALL BE OF CARBON STEEL EQUIVALENT TO A.S.T.M. A-307, GRADE B, WITH CADMIUM PLATING IN ACCORDANCE WITH A.S.T.M. A-165. EXCEPT THAT THE MIN. THICKNESS OF THE PLATING SHALL BE .0002 OF AN INCH. CADMIUM PLATED BOLTS SHALL HAVE CLASS 2A THREADS AND THE NUTS, ROD COUPLINGS AND TURNBUCKLES SHALL HAVE 2B THREADS.
2. HIGH STRENGTH, HEAT TREATED CAST IRON TEE-HEAD BOLTS WITH HEXAGON NUTS, ALL IN ACCORDANCE WITH THE STRENGTH REQUIREMENTS OF A.W.W.A. C-111, MAY BE USED IN LIEU OF THE CADMIUM PLATED BOLTS AND NUTS.
3. THE SKETCHES IN THIS SERIES OF FIGURES SHOW ACCEPTABLE METHODS OF PROVIDING ANCHORAGE. THERE IS NO PARTICULAR SIGNIFICANCE TO BE ATTACHED TO WHETHER THE SKETCH SHOWS A BELL AND SPIGOT JOINT OR A STANDARD MECHANICAL JOINT. THE ANCHORING PROCEDURE ILLUSTRATED APPLIES IN MOST CASES TO EITHER TYPE OF JOINT. IN SOME CASES, DIMENSIONS OF THE PARTICULAR PIPE OR HUB AND SPACE AVAILABLE FOR WORKING AROUND THE PARTICULAR JOINT WILL INFLUENCE THE CHOICE OF METHODS USED.
4. IN CERTAIN ASSEMBLIES OF RODS AND CLAMPS SHOWN, RODS RUN FROM A LUG ON THE FITTING (OR A CLAMP BEHIND THE HUB OF A BELL) TO A CLAMP AGAINST A FACE OF A BELL. NOTE THAT THIS ARRANGEMENT ANCHORS ONLY ONE JOINT. THE STABILITY OF THE JOINT WHERE THE CLAMP IS AGAINST THE FACE OF THE BELL DEPENDS ON HAVING SOIL ABOVE A RELATIVELY LONG PIECE OF PIPE ON BOTH SIDES OF THE JOINT. CONSEQUENTLY, IF THE DISTANCE BETWEEN THE FIRST AND SECOND JOINTS IS LESS THAN 12 FEET, THE SECOND JOINT SHOWN SHALL BE ANCHORED BY A CLAMP BEHIND THE HUB OF THE BELL AND RODS TO A CLAMP AT THE FACE OF THE NEXT BELL.
5. COATING TYPE: A.H.D. ASPHALTIC PRIMER 719(A). - ALL EXPOSED METAL.

SHEET 2 OF 2

DETAIL NO.

302-2



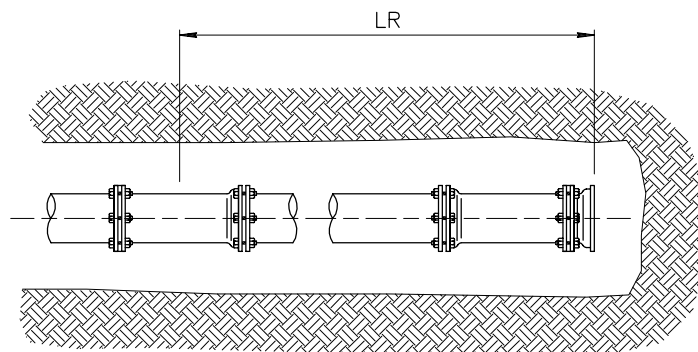
STANDARD DETAIL
ENGLISH

JOINT RESTRAINT WITH TIE RODS

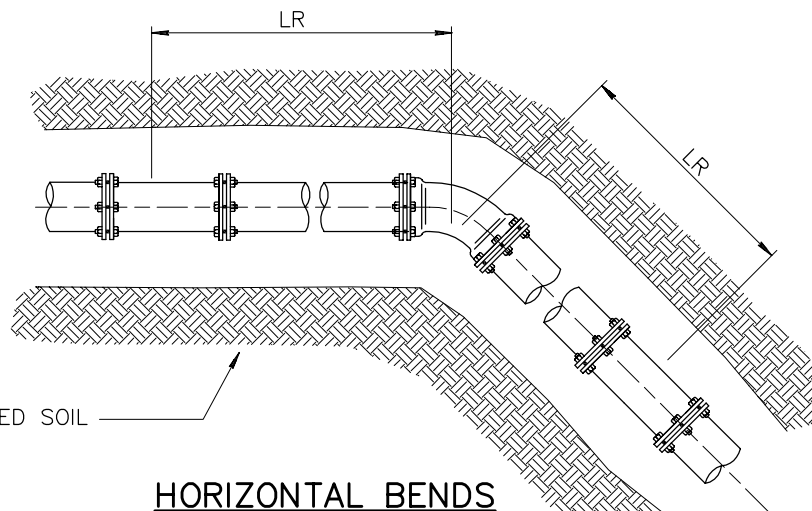
REVISED

DETAIL NO.

302-2

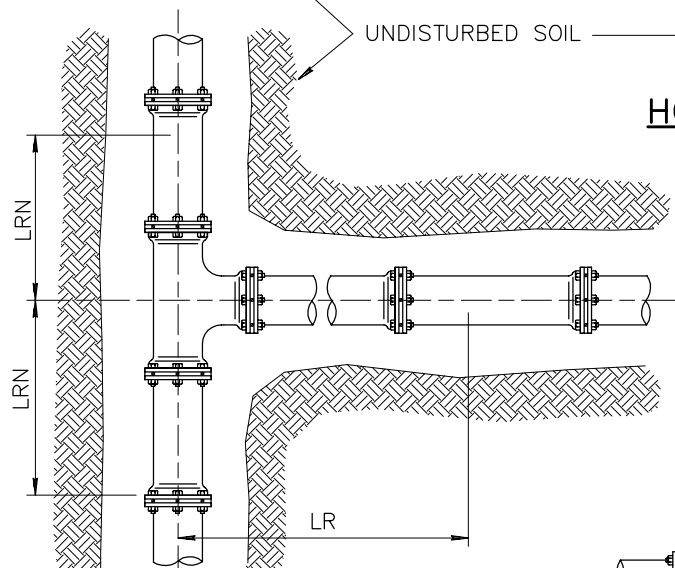


DEAD ENDS

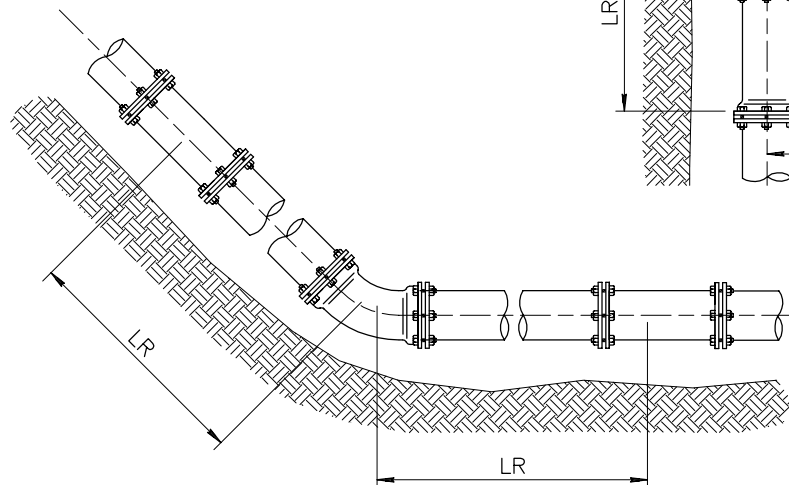


HORIZONTAL BENDS

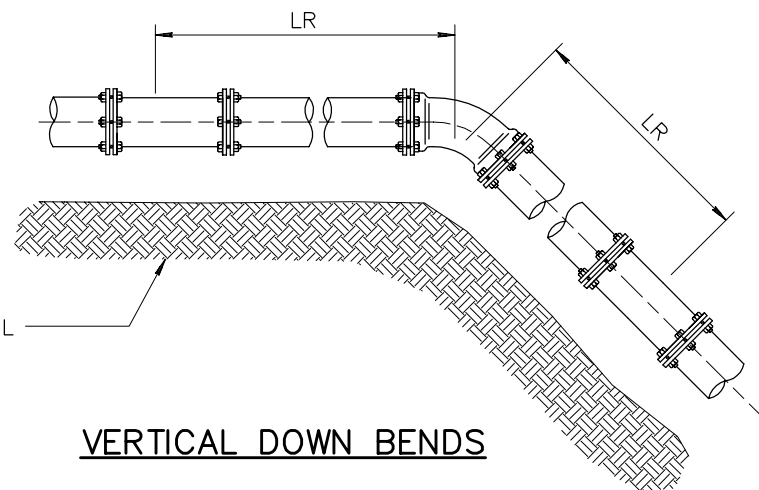
LRN = SHORTEST LENGTH
OF PIPE RESTRAINED TO
THE RUN OF THE TEE
FITTING (BOTH SIDES OF TEE).



TEES



VERTICAL UP BEND



VERTICAL DOWN BENDS

DETAIL NO.

303-1



**STANDARD DETAIL
ENGLISH**

**JOINT RESTRAINT FOR DUCTILE IRON AND
POLYETHYLENE WRAPPED DUCTILE IRON WATER PIPES**

REVISED

DETAIL NO.

303-1

RESTRAINED LENGTHS, LR, FOR DUCTILE IRON PIPE												
NOMINAL PIPE SIZE INCHES	HORIZONTAL BENDS			TEES		VERTICAL OFFSETS						DEAD ENDS
						90° BEND FITTINGS		45° BEND FITTINGS		22-1/2° BEND FITTINGS		
	90°	45°	22-1/2°	LRN=0'	LRN=10'	DOWN BEND	UP BEND	DOWN BEND	UP BEND	DOWN BEND	UP BEND	
4	18	7	4	30	8	31	18	13	7	6	3	31
6	25	10	5	43	20	44	25	18	10	9	5	44
8	32	13	6	56	34	58	32	24	13	11	6	58
10	38	16	8	68	45	69	38	29	16	14	8	69
12	45	19	9	80	57	81	45	34	19	16	9	81
14	51	21	10	91	68	92	51	38	21	18	10	92
16	57	24	11	103	79	104	57	43	24	21	11	104
18	62	26	12	113	90	115	62	48	26	23	12	115
20	68	28	14	125	100	126	68	52	28	25	14	126
24	79	33	16	145	121	147	79	61	33	29	16	147

RESTRAINED LENGTHS, LR, FOR DUCTILE IRON PIPE WITH POLYETHYLENE WRAP												
NOMINAL PIPE SIZE INCHES	HORIZONTAL BENDS			TEES		VERTICAL OFFSETS						DEAD ENDS
						90° BEND FITTINGS		45° BEND FITTINGS		22-1/2° BEND FITTINGS		
	90°	45°	22-1/2°	LRN=0'	LRN=10'	DOWN BEND	UP BEND	DOWN BEND	UP BEND	DOWN BEND	UP BEND	
4	26	11	5	69	18	72	26	30	11	14	5	72
6	36	15	7	99	47	102	36	42	15	20	7	102
8	47	19	9	130	78	133	47	55	19	26	9	133
10	56	23	11	157	103	159	56	66	23	32	11	159
12	65	27	13	185	131	187	65	77	27	37	13	187
14	74	31	15	211	156	214	74	89	31	42	15	214
16	82	34	16	238	183	241	82	100	34	48	16	241
18	90	37	18	263	207	266	90	110	38	53	18	266
20	98	41	20	289	233	292	98	121	41	58	20	292
24	113	47	22	337	280	340	113	141	47	68	22	340

NOTES:

1. ALL JOINTS WITHIN THE SPECIFIED LENGTH LR MUST BE RESTRAINED.
ALL LENGTHS ARE GIVEN IN FEET.
2. THE MAXIMUM TEST PRESSURE SHALL NOT EXCEED 200 PSI
3. THE MINIMUM DEPTH OF BURY SHALL BE 3' TO TOP OF PIPE.
4. RESTRAINED LENGTHS MAY BE REDUCED WHEN SUPPORTED BY ENGINEERING CALCULATIONS.

DETAIL NO.

303-2



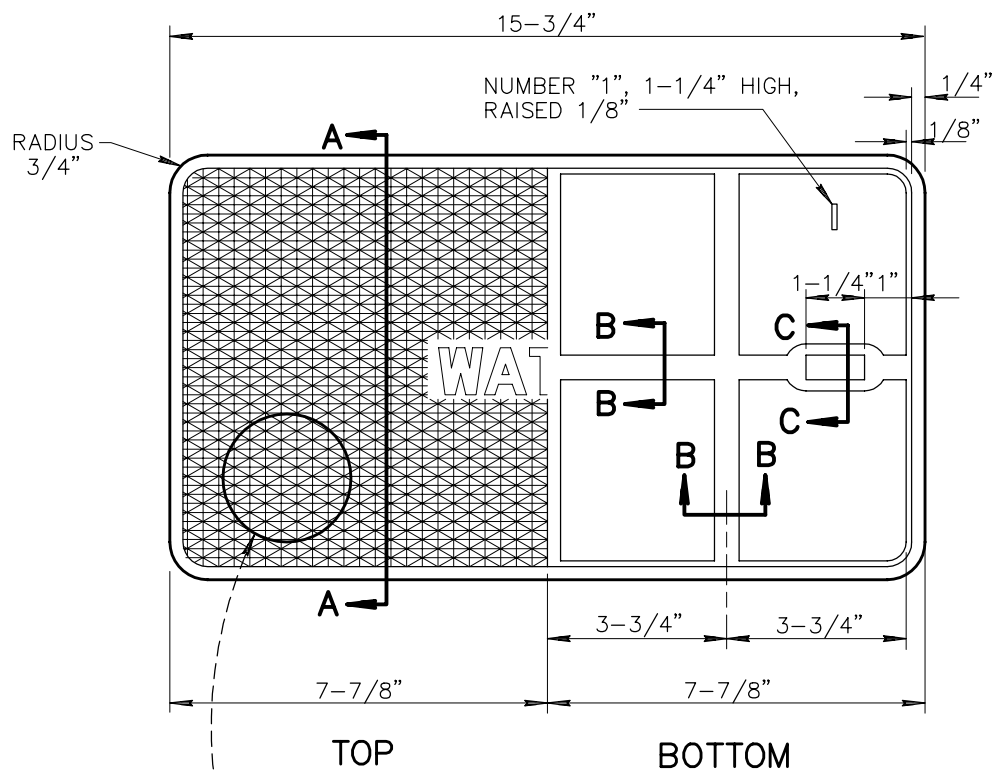
STANDARD DETAIL
ENGLISH

**JOINT RESTRAINT FOR DUCTILE IRON AND
POLYETHYLENE WRAPPED DUCTILE IRON WATER PIPES**

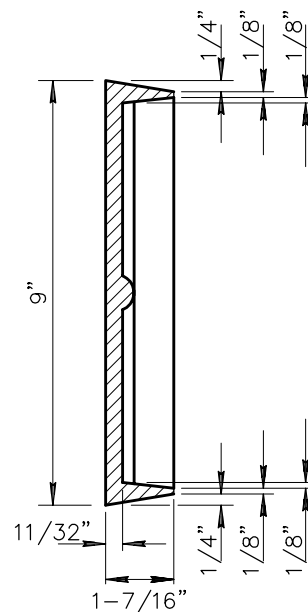
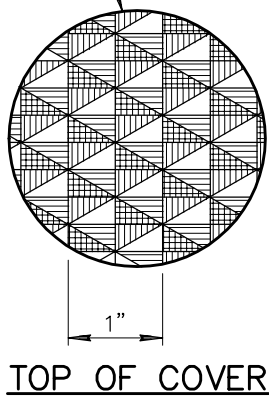
REVISED

DETAIL NO.

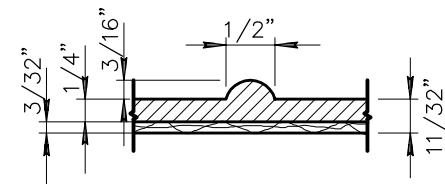
303-2



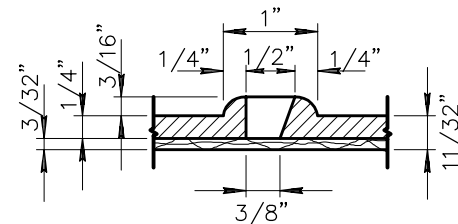
PLAN



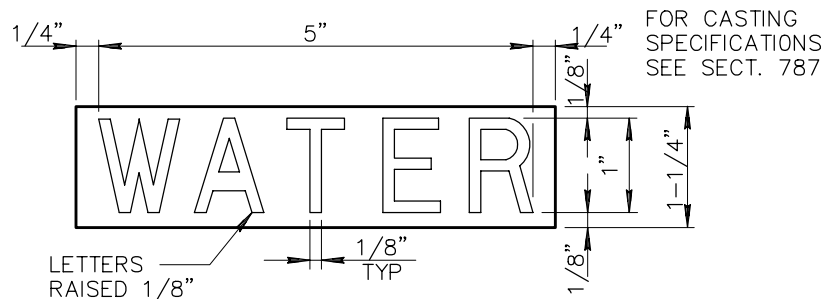
SECTION A-A



SECTION B-B



SECTION C-C



DETAIL NO.

310



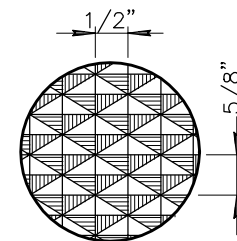
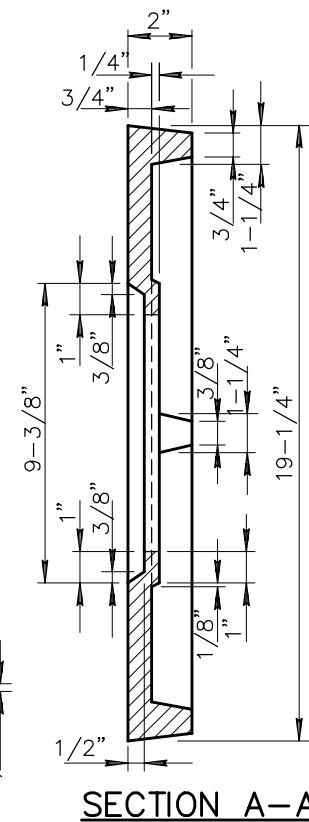
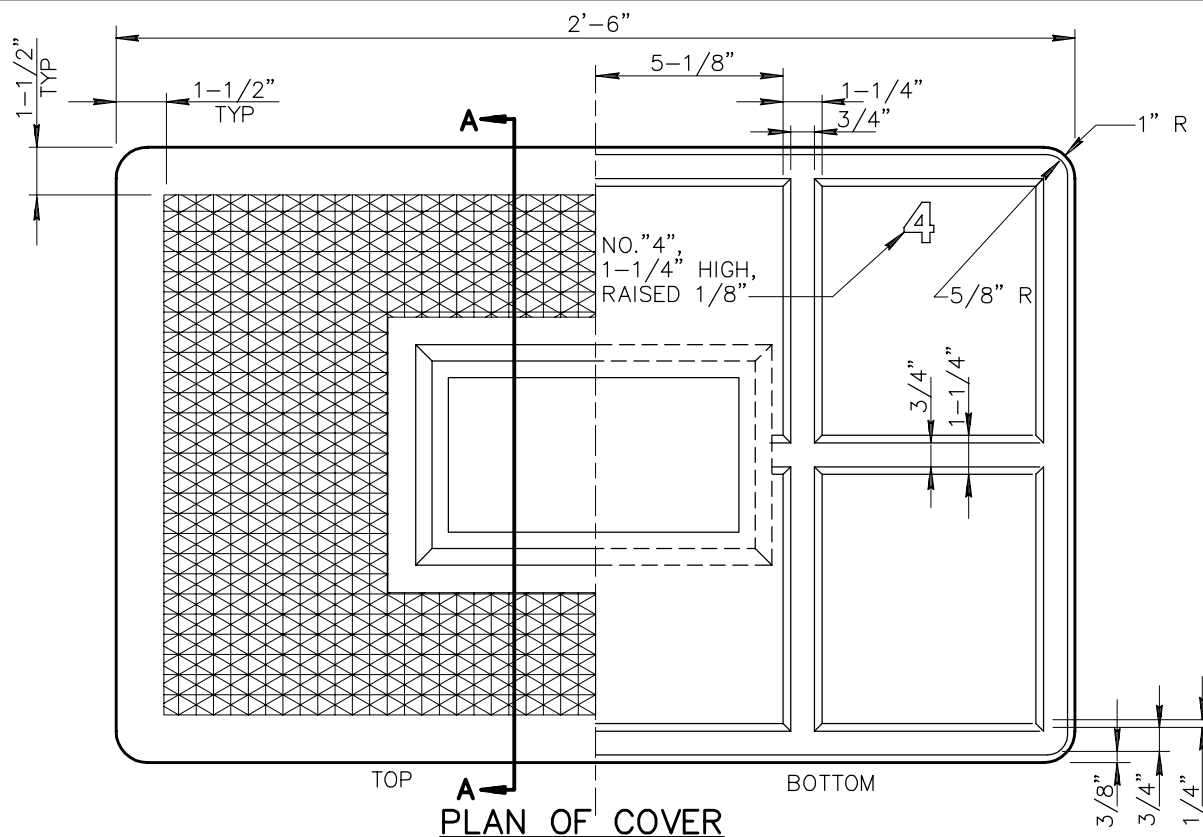
STANDARD DETAIL
ENGLISH

CAST IRON WATER METER BOX
COVER NO. 1

REVISED

DETAIL NO.

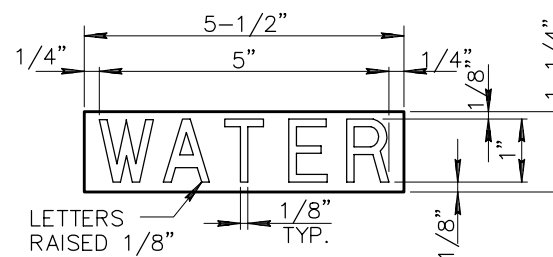
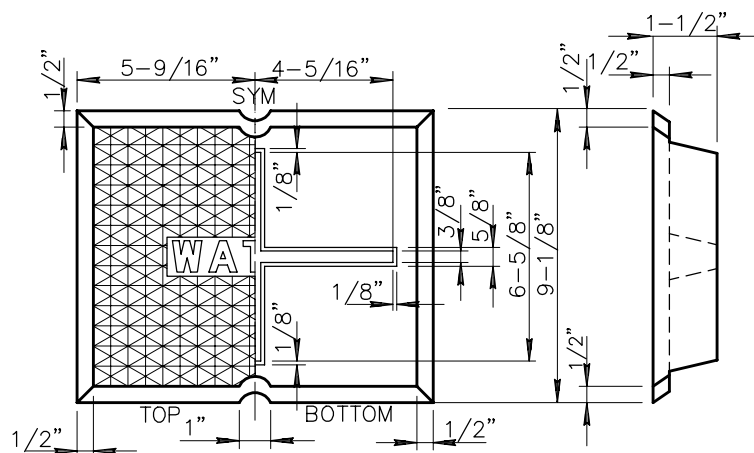
310



TOP OF COVER

NOTES:

1. FOR CASTING SPECIFICATIONS, SEE SECT. 787. THE BEARING
2. THE BEARING EDGES OF THESE CASTINGS SHALL BE MACHINED TO INSURE A FULL BEARING ON A FLAT SURFACE.



DETAIL NO.

313



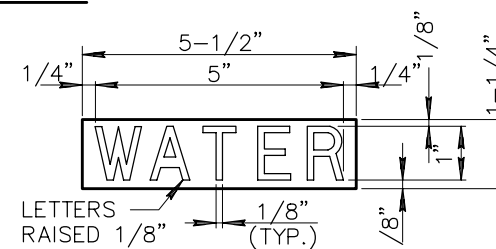
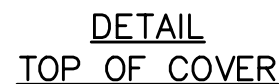
STANDARD DETAIL
ENGLISH

CAST IRON WATER METER BOX
COVER NO. 4

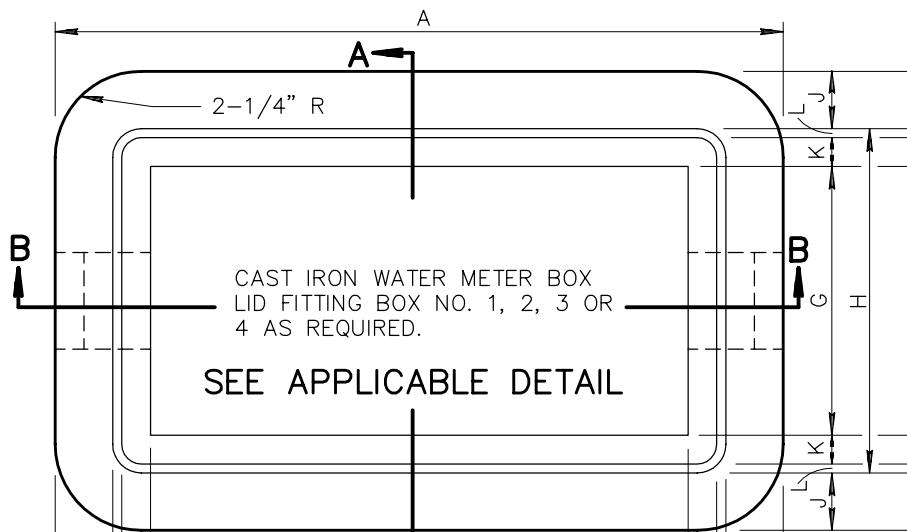
REVISED

DETAIL NO.

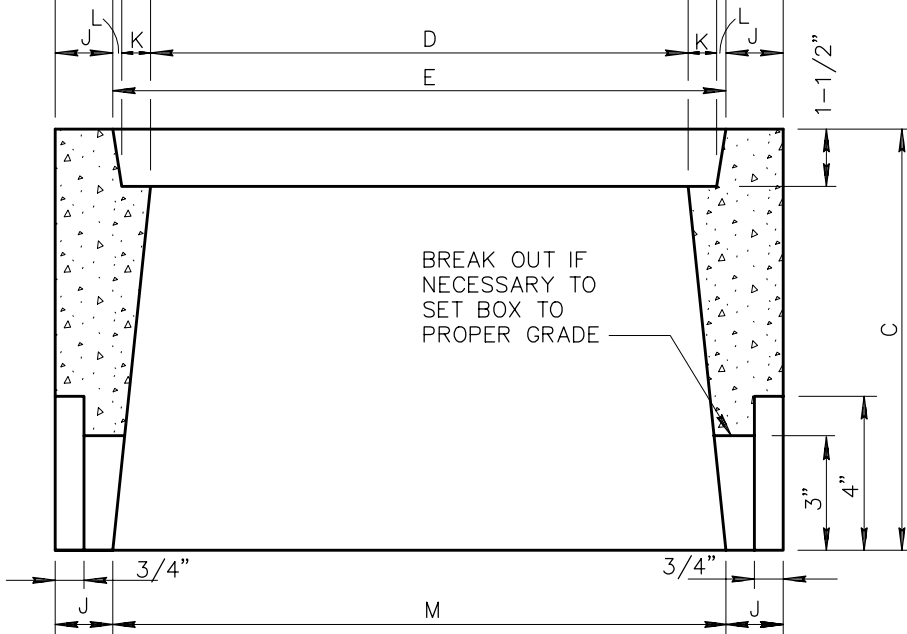
313



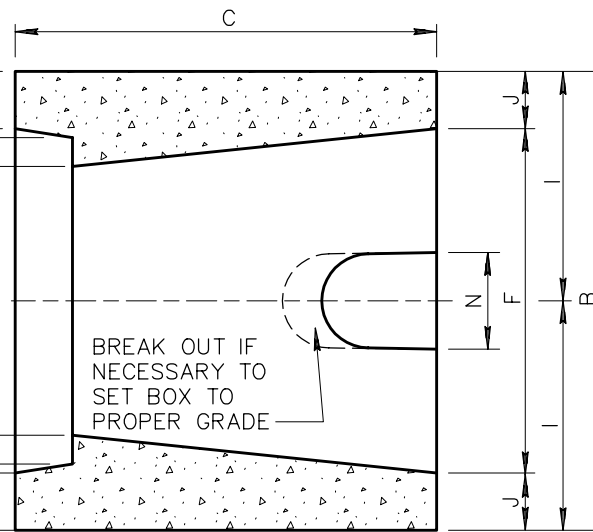
1. FOR CASTING SPECIFICATIONS, SEE SECT. 787.
2. THE BEARING EDGES OF THESE CASTINGS SHALL BE MACHINED TO INSURE A FULL BEARING ON A FLAT SURFACE.



PLAN VIEW



SECTION B-B



SECTION A-A

NOTES:

1. THE METER BOXES SHALL CONFORM TO THE DIMENSIONS AS SHOWN AND SHALL BE MADE OF PORTLAND CEMENT CONCRETE POURED AND TAMPED (OR VIBRATED) IN TRUE FORMS.
2. USE CLASS 'AA' CONCRETE PER SECT. 725.

METER BOX DIMENSIONS				
DIMS	BOX NUMBER			
	1	2	3	4
A	19"	24-1/2"	29-1/2"	33-1/2"
B	12"	16-3/4"	18-1/2"	22-3/4"
C	11"	12"	13"	12"
D	14"	19"	23-3/4"	27-3/4"
E	16"	22"	26-1/2"	30-1/2"
F	9"	13-1/4"	15"	19-3/4"
G	7"	11-1/4"	12-3/4"	17"
H	9"	14-1/4"	15-1/2"	19-3/4"
I	6"	8-3/8"	9-1/4"	11-3/8"
J	1-1/2"	1-3/4"	1-3/4"	1-1/2"
K	3/4"	1-1/8"	1"	1"
L	1/4"	3/8"	3/8"	3/8"
M	16"	21"	25-1/2"	30-1/2"
N	2-1/2"	3-1/2"	4"	4"
	5/8" OR 3/4" METER	1" METER	1-1/2" METER	2" METER

DETAIL NO.

320



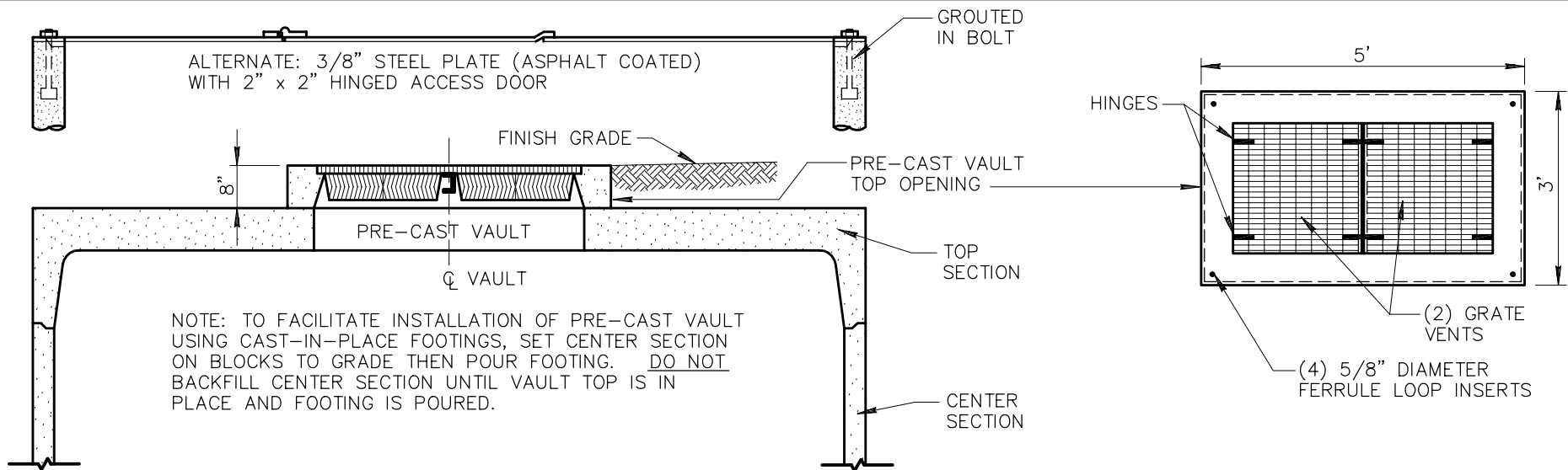
STANDARD DETAIL
ENGLISH

CONCRETE WATER METER BOXES

REVISED

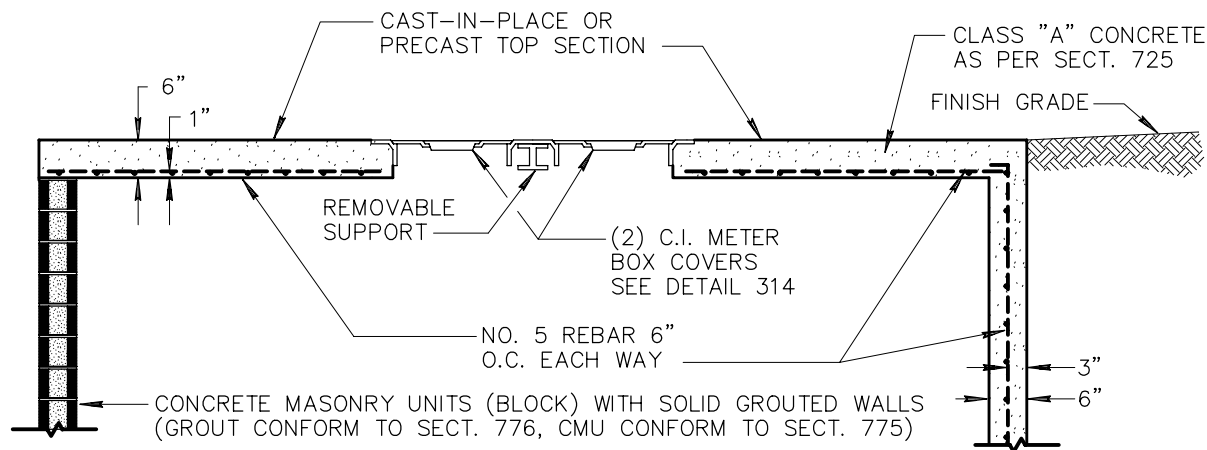
DETAIL NO.

320



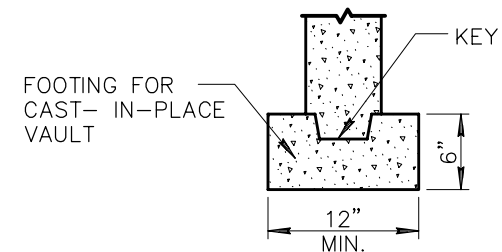
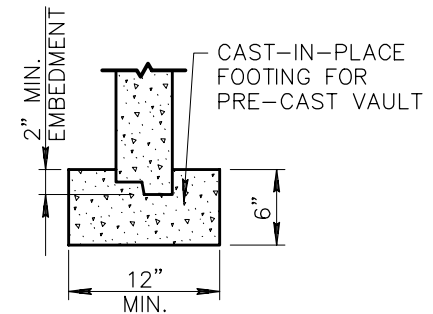
PRE-CAST VAULT SECTION

NOTE: PRECAST REINFORCED VAULT SECTIONS SHALL BE CONSTRUCTED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND DETAILS AS APPROVED BY ENGINEER.



BLOCK MASONRY MAY BE USED IN LIEU OF CAST-IN-PLACE VAULT WALLS, NO. 4 REBAR IN EVERY OTHER CORE.

CAST-IN-PLACE VAULT SECTION



DETAIL NO.

321



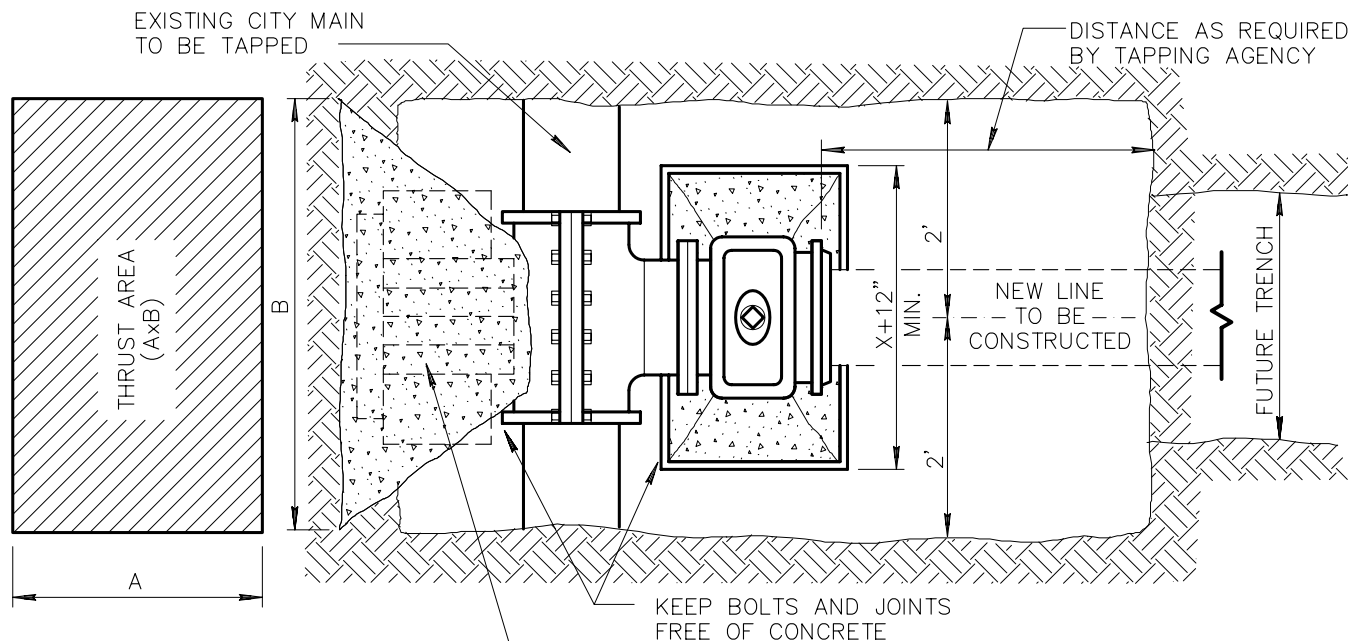
STANDARD DETAIL
ENGLISH

STANDARD WATER METER VAULT

REVISED

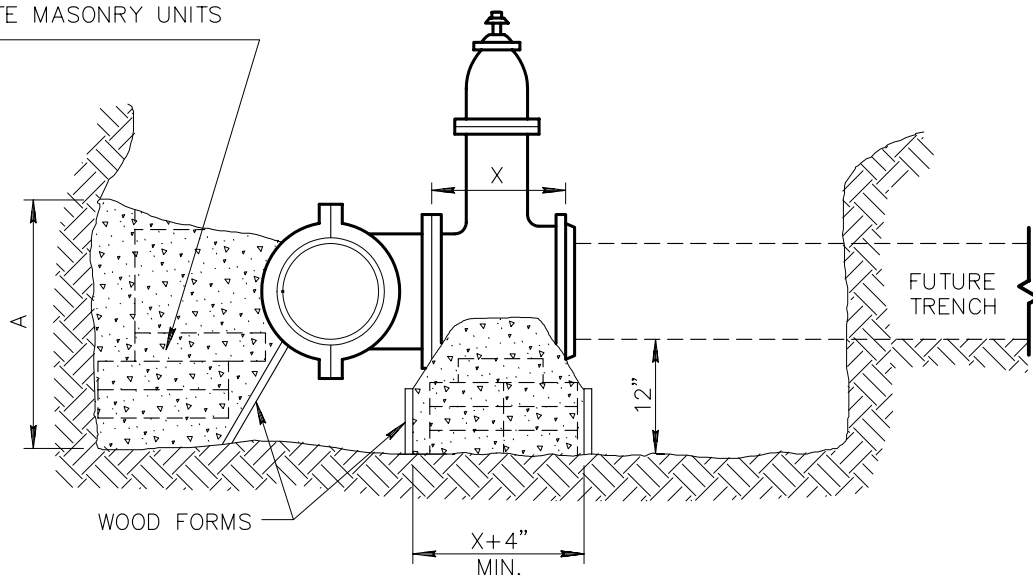
DETAIL NO.

321



PLAN

OPTIONAL BLOCKING – 2" x 8" x 12"
SOLID CONCRETE MASONRY UNITS
AS INDICATED.



ELEVATION

NOTES:

1. TAPPING SLEEVE TO BE PLACED A MINIMUM OF 18" FROM ANY BELL COUPLING, VALVE, FITTING OR OTHER OBSTRUCTION
2. CONTRACTOR SHALL EXCAVATE AS SHOWN AND SHALL SET TAPPING SLEEVE AND VALVE AND TIGHTEN ALL BOLTS PRIOR TO THE PRESSURE TEST.
3. ALL TAPPING SLEEVES AND VALVES MUST BE PRESSURE TESTED PRIOR TO BLOCKING OR TAPPING. THE TEST MUST BE WITNESSED AND APPROVED BY THE INSPECTOR.
4. BLOCKS ARE TO EXTEND TO UNDISTURBED GROUND AND BE INSTALLED BEFORE THE TAP IS MADE. ALL FLANGE BOLTS SHALL BE FREE AND CLEAR OF CONCRETE.
5. CONCRETE THRUST BLOCKS SHALL BE CLASS 'B' PER SECT. 725. NORMALLY, CURE TIME FOR CONCRETE IS 24 HOURS BEFORE BACKFILLING.
6. TAPS SHALL BE MADE BY CITY CREWS AT PREVAILING RATES OR BY APPROVED CONTRACTORS WHEN ALLOWED BY AGENCY.
7. THIS DETAIL COVERS TAPPING SLEEVES 4" THROUGH 16" IN SIZE ON DUCTILE IRON, CAST IRON AND ASBESTOS CEMENT PIPE. ANY OTHER SIZE OR TYPE OF PIPE WILL REQUIRE A SEPARATE SUBMITTAL AND APPROVAL BY THE ENGINEER.

SIZE OF PIPE BEING CONNECTED	MINIMUM THRUST AREA REQUIRED EQUALS (AxB) (SQUARE FEET)
4" AND LESS	3
6"	4
8"	6
10"	9
12"	13
16"	23

DETAIL NO.

340



**STANDARD DETAIL
ENGLISH**

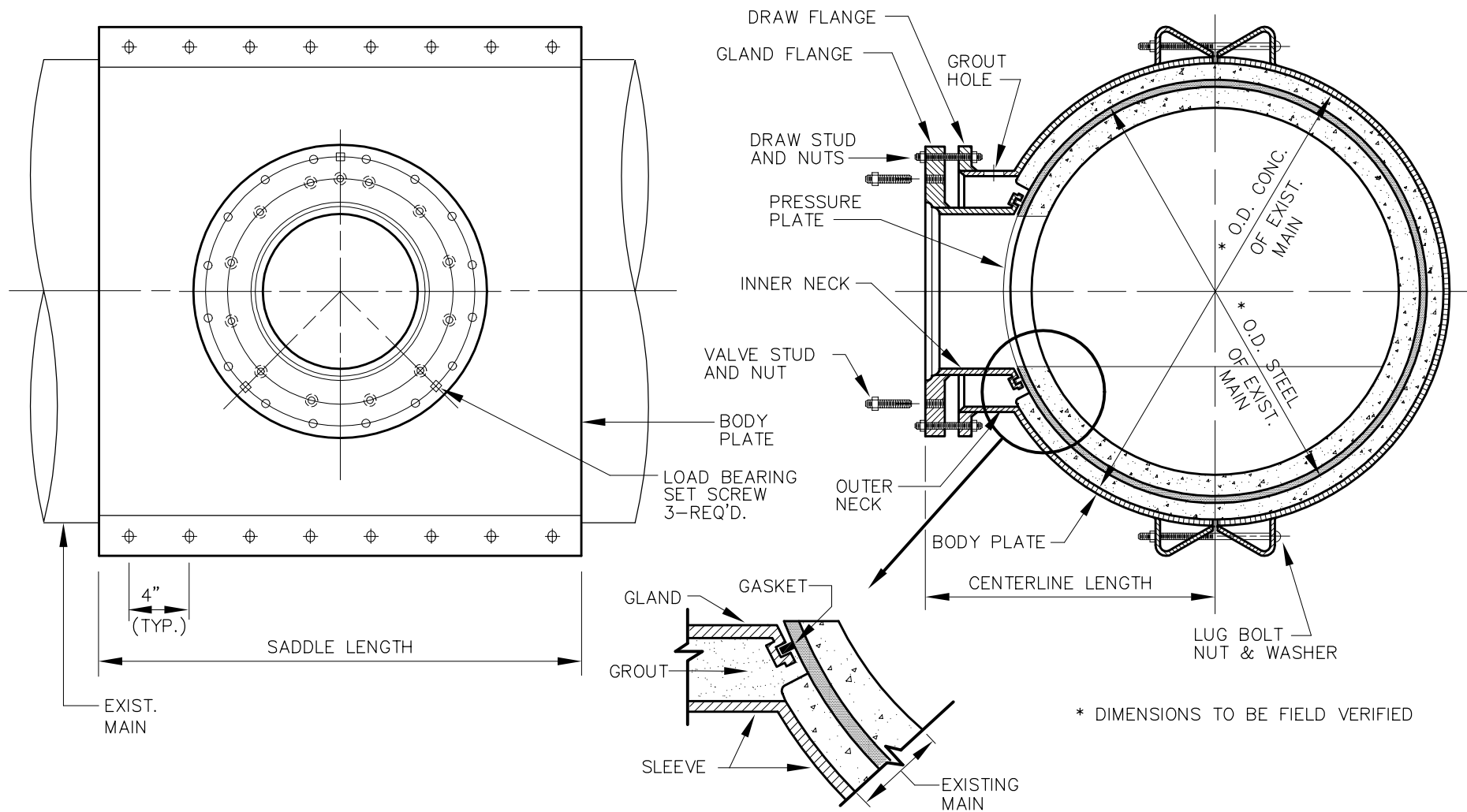
INSTALLING TAPPING SLEEVES AND VALVES

REVISED

01-03-2002

DETAIL NO.

340



DETAIL NO.

342



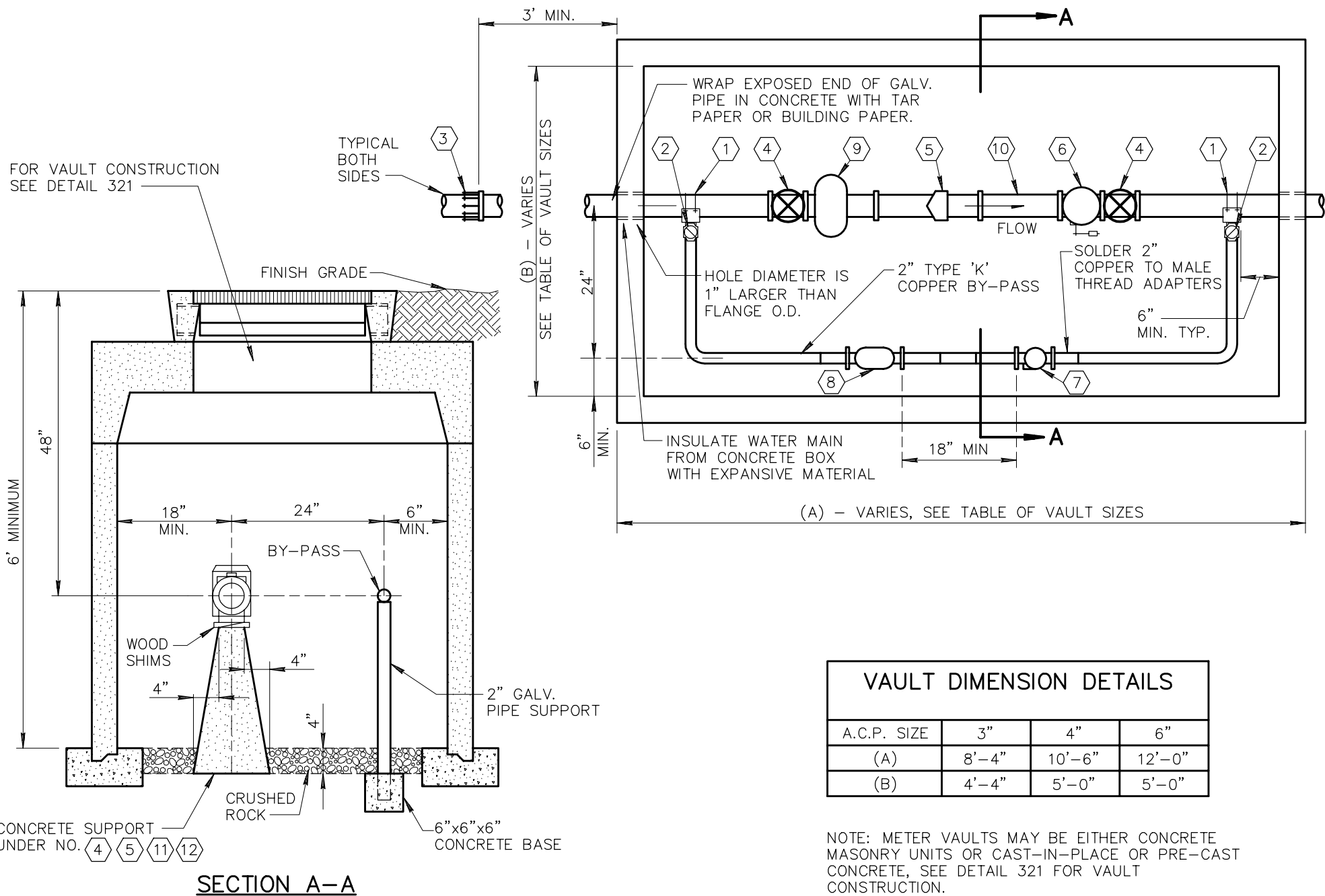
STANDARD DETAIL
 ENGLISH

CONCRETE PRESSURE PIPE TAPPING SLEEVE

REVISED

DETAIL NO.

342



DETAIL NO.

345-1



STANDARD DETAIL
ENGLISH

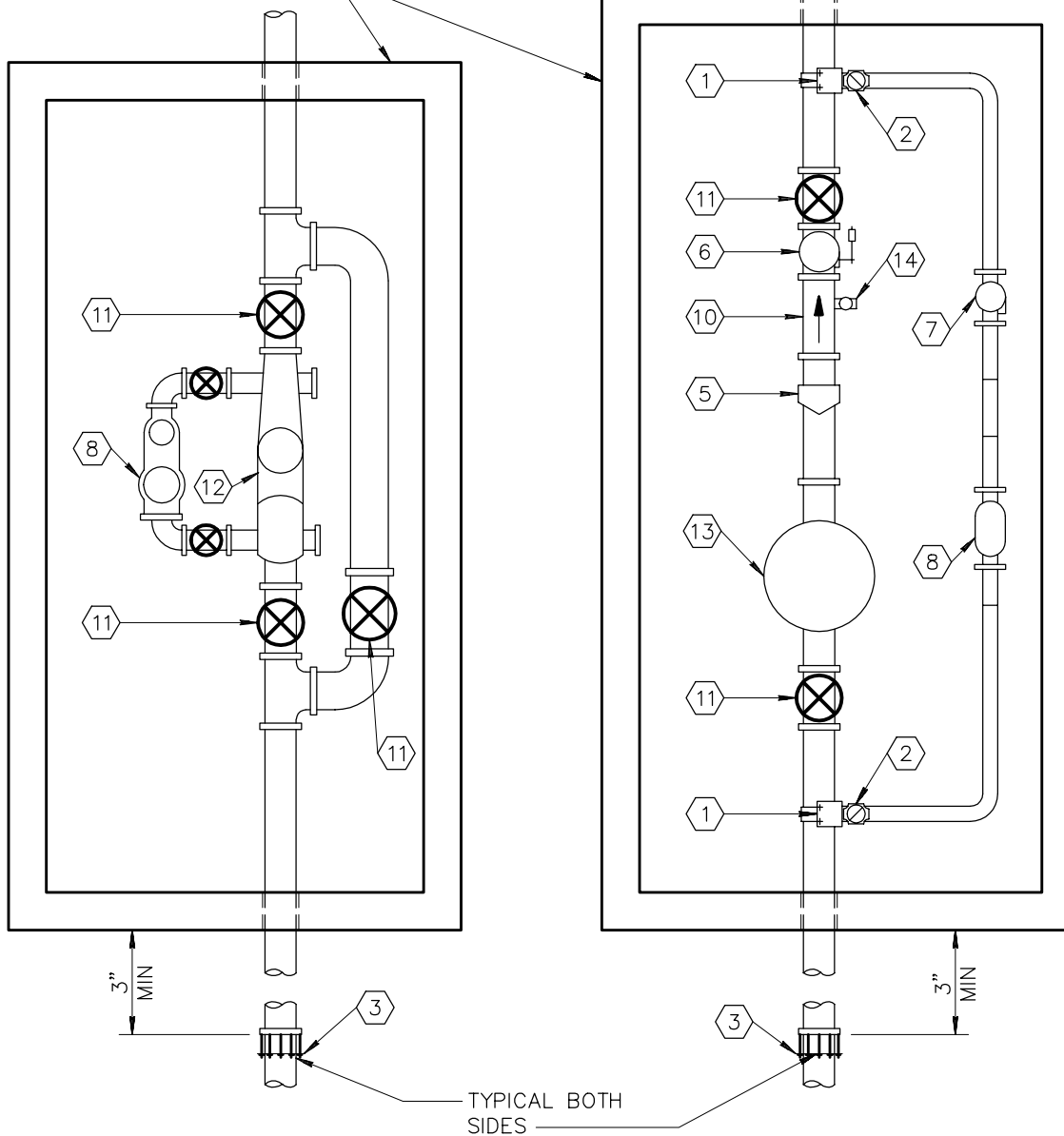
3", 4", 6" WATER METER

REVISED

DETAIL NO.

345-1

FOR VAULT CONSTRUCTION
SEE DETAIL 321



LEGEND

- 1 DOUBLE STRAP ALL BRONZE SERVICE SADDLES.
- 2 CORP. STOP, 2" (BALL TYPE).
- 3 ADAPTER, FLANGED, TO MECH. JOINT FOR A.C.P.
- 4 GATE VALVE, FLANGED, WITH HAND WHEEL, OPEN LEFT.
- 5 TURBOMETER: ROCKWELL SERIES 'W' OR HERSEY SERIES 'M.H.R.' OR NEPTUNE TRIDENT TURBINE.
- 6 FLANGED SWING CHECK VALVE WITH EXTERNAL LEVER AND WEIGHT.
- 7 2" BRONZE CHECK VALVE.
- 8 2" TURBOMETER: ROCKWELL 'W-160' OR HERSEY 'M.H.R.' OR NEPTUNE TRIDENT TURBINE.
- 9 STRAINER (3", 4", 6") AVAILABLE FROM METER MANUFACTURER, INSTALL ONLY WHEN 'TURBO' IS USED.
- 10 FLANGED SPOOL (3 PIPE DIAMETERS IN LENGTH).
- 11 O.S.&Y. GATE VALVE, FLANGED WITH HAND WHEEL OPEN LEFT, AND RISING STEM.
- 12 TURBOMETER U.L. APPROVED: ROCKWELL W-5000 DR. OR W-2000 DR. OR HERSEY F.M.-C.T. OR NEPTUNE TURBINE-F.S.-U.L.
- 13 6" OR 10" STRAINER, U.L. APPROVED.
- 14 2" THREADED OUTLET AND GATE VALVE.

NOTES

- 1. FOR LARGER METERS, SPECIAL VAULT DESIGN IS REQUIRED.
- 2. USE OF REMOTE READING DEVICE AT OPTION OF UTILTY.
- 3. CERTAIN AGENCIES AND/OR UTILITIES PREFER TO CONSTRUCT VAULT, CONTACT AGENCY INVOLVED PRIOR TO VAULT CONSTRUCTION.

DETAIL NO.

345-2



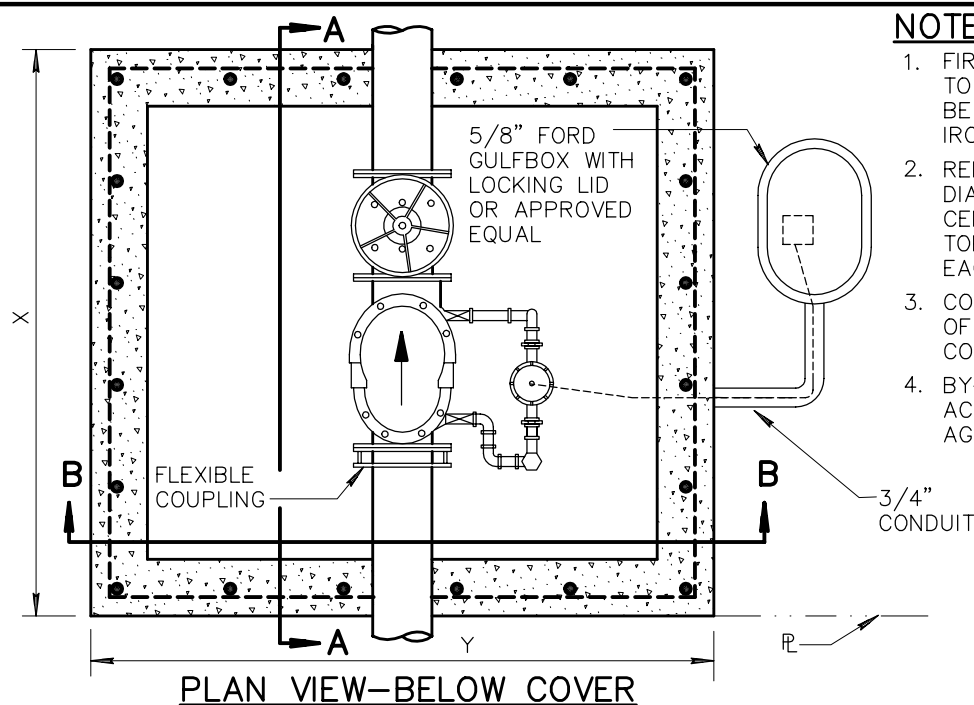
STANDARD DETAIL
ENGLISH

4", 6" WATER METER
WITH ON-SITE FIRE HYDRANTS

REVISED

DETAIL NO.

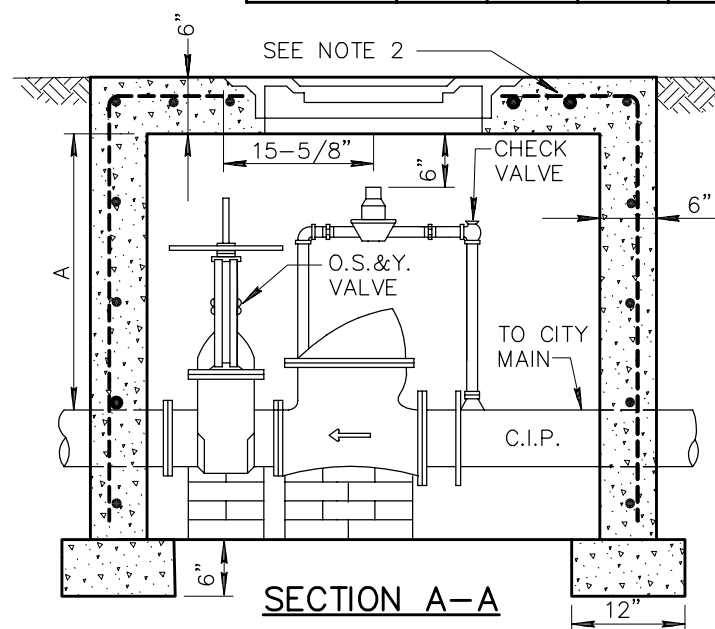
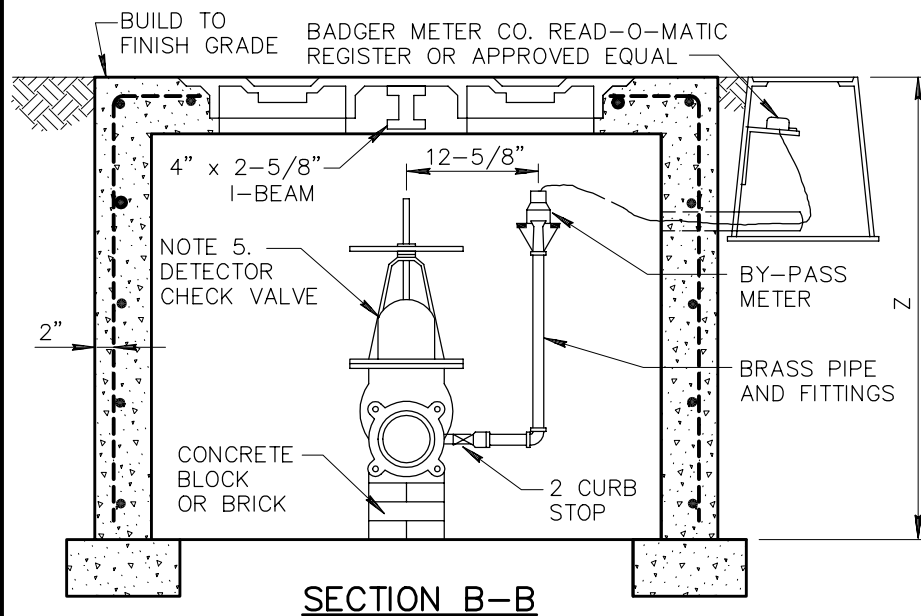
345-2



NOTES:

1. FIRELINE FROM CITY MAIN TO PROPERTY LINE SHALL BE CONSTRUCTED OF CAST IRON PIPE.
2. REINFORCING TO BE 1/2" DIAMETER REBAR ON 6" CENTERS EACH WAY ON TOP AND 12" CENTERS EACH WAY ON THE SIDES.
3. COVERS TO CONSIST OF TWO METER BOX COVERS DET. 314.
4. BY-PASS METER TO BE ACCORDING TO GOVERNING AGENCY.
5. CHECK VALVE TO BE GLOBE MODEL "A" GRINNELL, HERSEY MODEL D.C., VIKING MODEL "A" OR APPROVED EQUAL.
6. VAULT SHALL BE CONSTRUCTED IN OWNERS PROPERTY AGAINST THE FRONT PROPERTY LINE OR ANOTHER APPROVED LOCATION. WALLS AND FENCES SHALL NOT OBSTRUCT ACCESS.
7. CITY CONTROL VALVE TO BE REQUIRED AT MAIN.
8. PARTS OF PIPE TO BE EMBEDDED IN CONC. SHALL BE WRAPPED WITH 30 LB ASPHALT ROOFING FELT.
9. REMOTE READING DEVICE SHALL BE OF SELF GENERATING ELECTRICAL TYPE. HYDRAULIC OR MECHANICAL DRIVE REGISTERS WILL NOT BE ACCEPTABLE.
10. CONCRETE TO BE CLASS 'B' PER SECT. 725.

DIA. OF PIPE	X	Y	Z	BY-PASS METER SIZE	A
4"	60"	66"	49"	5/8" x 3/4"	30"
6"	66"	72"	49"	5/8" x 3/4"	30"
8"	72"	72"	58"	1"	36"
10"	78"	72"	69"	1-1/2"	36"



DETAIL NO.

346



STANDARD DETAIL
ENGLISH

FIRE LINE DETECTOR CHECK VAULT

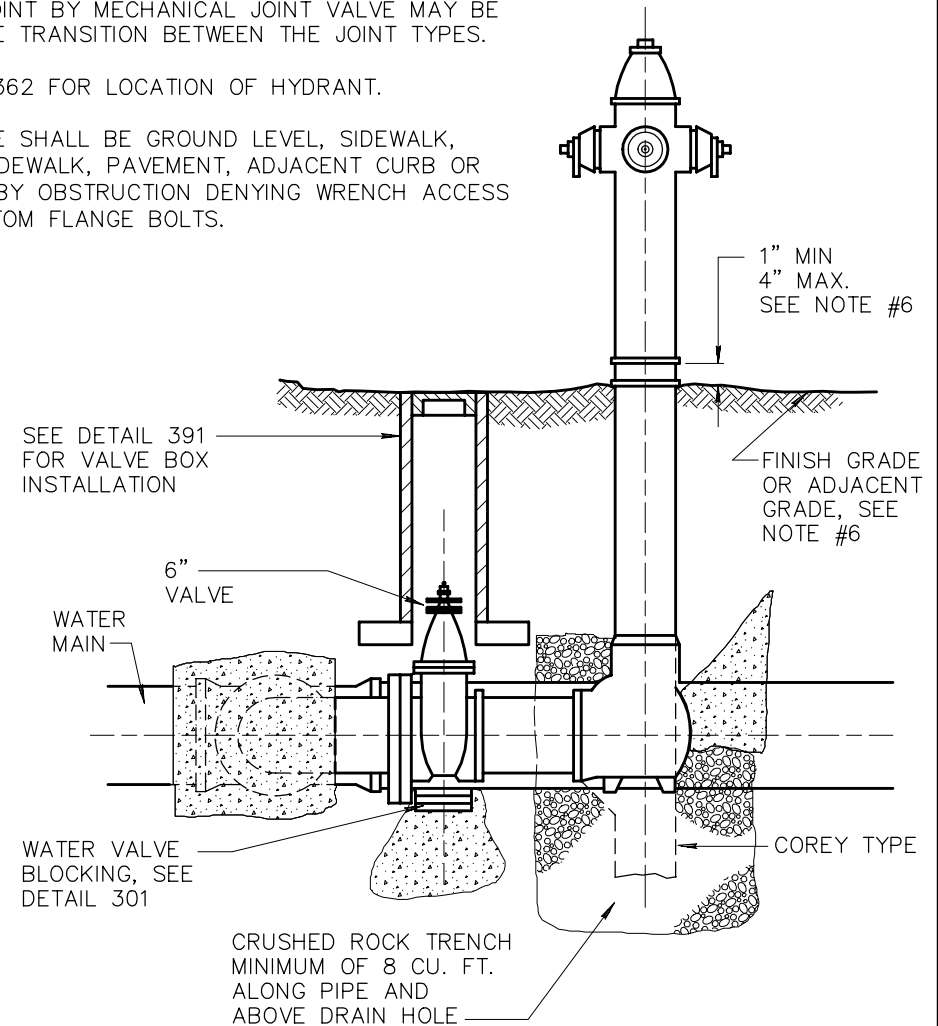
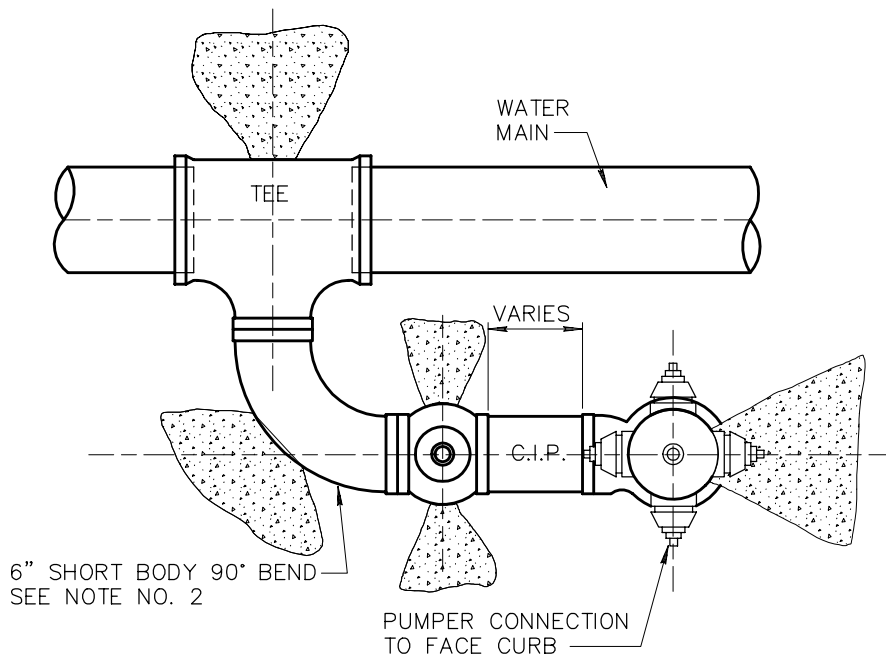
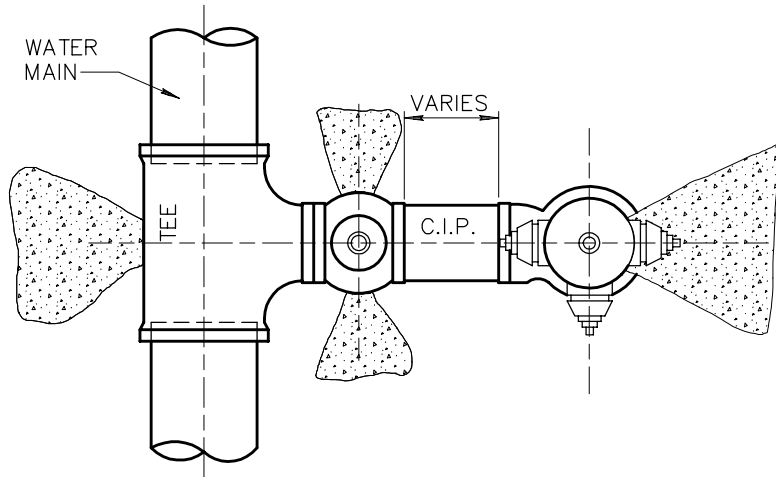
REVISED

DETAIL NO.

346

NOTES:

1. JOINTS BETWEEN THE VALVE AND THE MAIN SHALL BE FLANGED TYPE. JOINTS BETWEEN THE VALVE AND HYDRANT SHALL BE RESTRAINT OR MECHANICAL TYPE.
2. 90° BEND NOT REQUIRED IF SUFFICIENT ROOM FOR PERPENDICULAR INSTALLATION.
3. FOR CONCRETE THRUST BLOCKS, SEE DETAIL 380.
4. A FLANGE JOINT BY MECHANICAL JOINT VALVE MAY BE USED AS THE TRANSITION BETWEEN THE JOINT TYPES.
5. SEE DETAIL 362 FOR LOCATION OF HYDRANT.
6. FINISH GRADE SHALL BE GROUND LEVEL, SIDEWALK, ADJACENT SIDEWALK, PAVEMENT, ADJACENT CURB OR OTHER NEARBY OBSTRUCTION DENYING WRENCH ACCESS TO THE BOTTOM FLANGE BOLTS.



DETAIL NO.

360



STANDARD DETAIL
ENGLISH

FIRE HYDRANT INSTALLATION

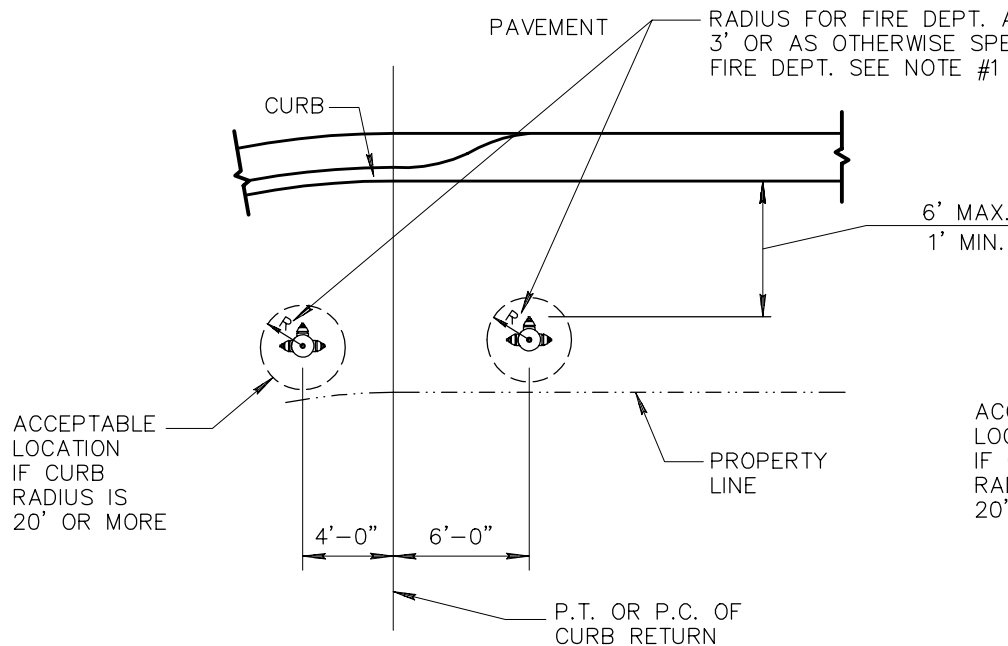
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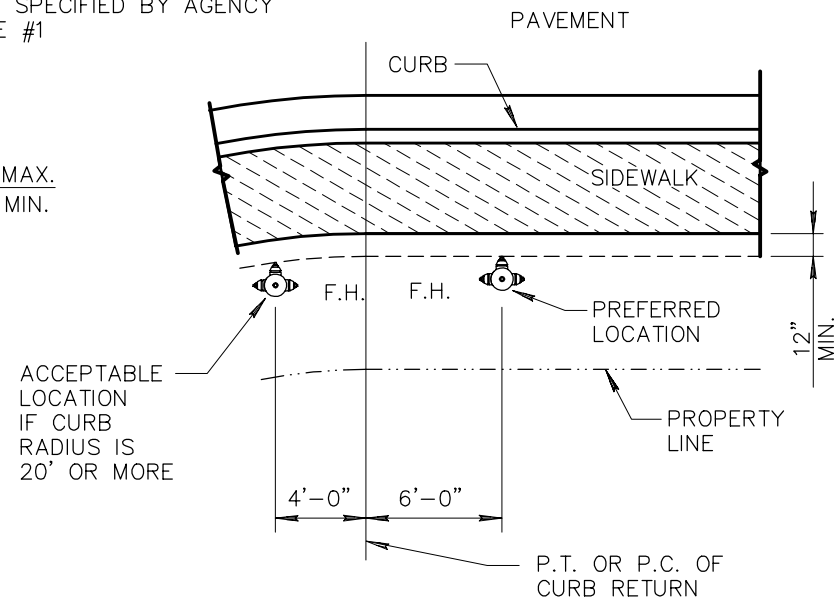
360

NOTES:

1. OBSTRUCTIONS SUCH AS UTILITY POLES, STREET SIGNS, IRRIGATION BOXES, FENCES, ETC., MUST NOT BE PLACED BETWEEN CURB AND HYDRANT AND WITHIN THE RADIUS FOR FIRE DEPT. ACCESS.
2. DIMENSIONS SHOWN ON CONSTRUCTION DRAWINGS SUPERSEDE LOCATIONS SHOWN HERE.
3. ON LOCATIONS IN MIDBLOCK, THE FIRE HYDRANT WILL BE ALIGNED WITH A PROPERTY LINE.



PARKWAY AREA OR NO SIDEWALK



AREA WITH SIDEWALK

DETAIL NO.

362



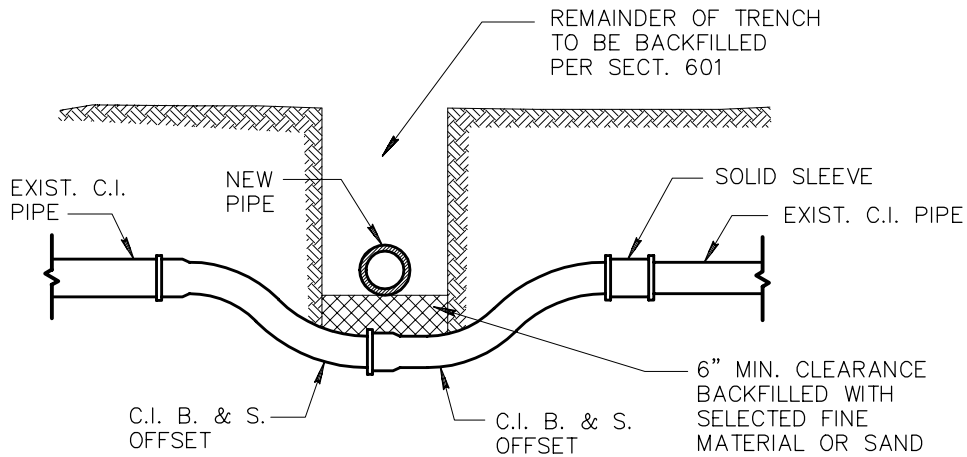
STANDARD DETAIL
ENGLISH

LOCATIONS FOR NEW FIRE HYDRANTS

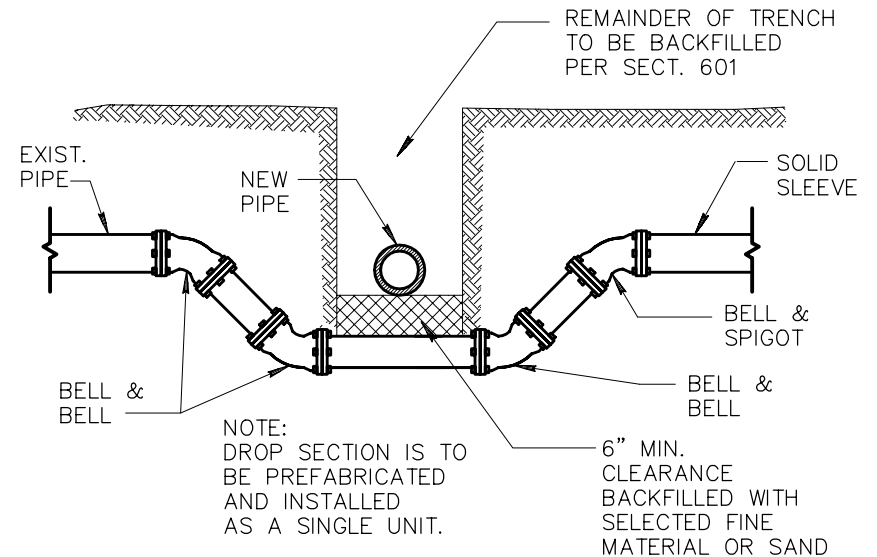
REVISED

DETAIL NO.

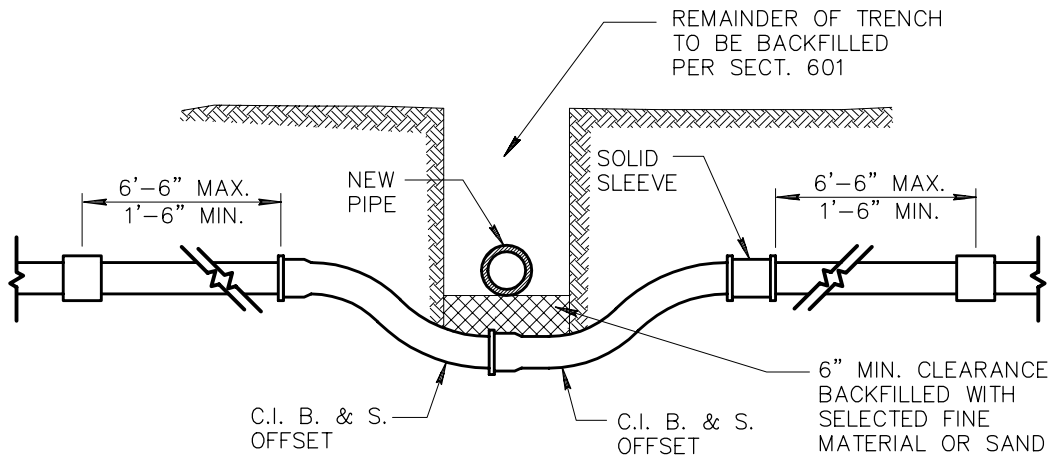
362



CAST IRON



CAST IRON MECHANICAL JOINT



ASBESTOS CEMENT

NOTES:

1. THIS DETAIL COVERS MOVING OF WATER MAINS 2" TO 12" ONLY.
2. THRUST BLOCKING AS PER DET. 380 & 381.
3. IF OFFSET IS TO GO OVER OBSTRUCTION, JOINT RESTRAINTS MUST BE USED.
4. PIPE IS TO BE CAST IRON OR DUCTILE IRON.

DETAIL NO.

370



STANDARD DETAIL
ENGLISH

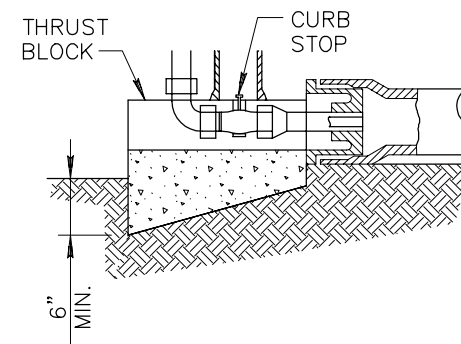
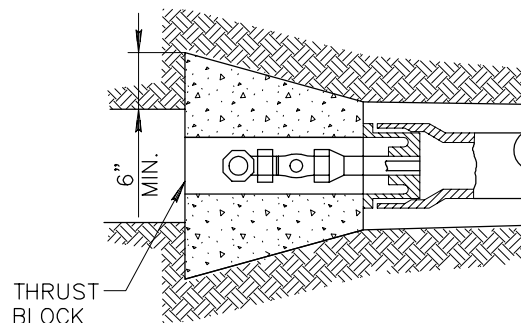
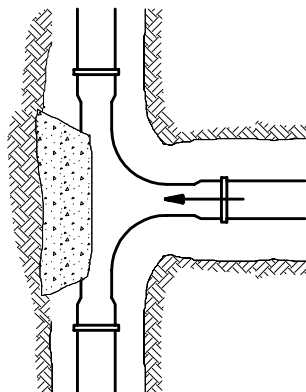
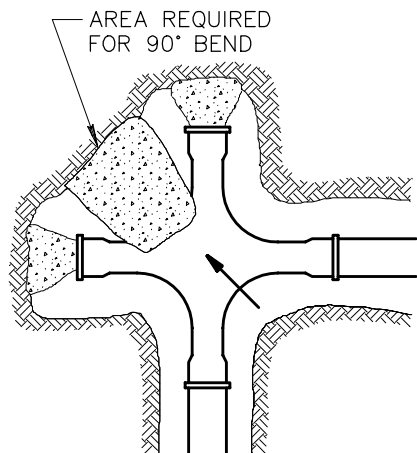
VERTICAL REALIGNMENT OF WATER MAINS

REVISED

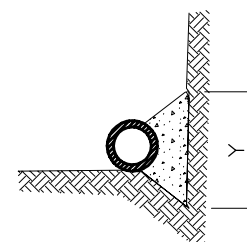
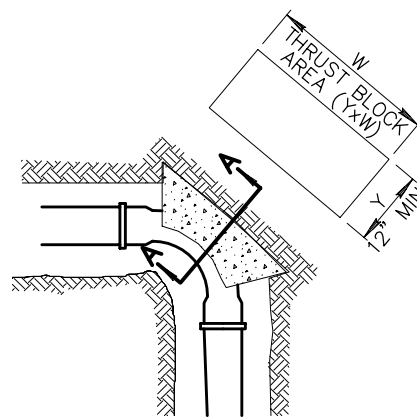
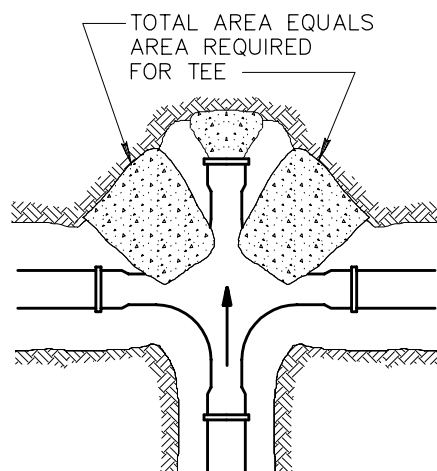
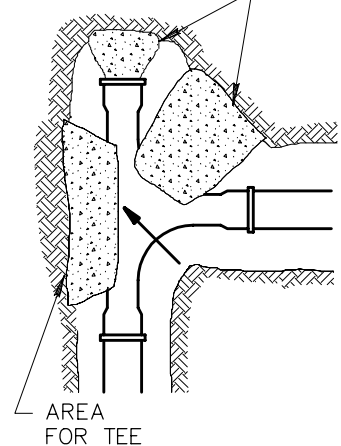
DETAIL NO.

370

TYPICAL LOCATIONS OF THRUST BLOCKS



1/2 AREA REQUIRED
FOR 90° BEND



SECTION A-A

NOTES:

1. TABLE IS BASED ON 200 P.S.I. TEST PRESSURE AND 3,000 LBS/SQ. FT. SOIL. IF CONDITIONS ARE FOUND TO INDICATE SOIL BEARING IS LESS, THE AREAS SHALL BE INCREASED ACCORDINGLY.
2. AREAS FOR PIPES LARGER THAN 16" SHALL BE CALCULATED FOR EACH PROJECT.
3. FORM ALL NON-BEARING VERTICAL SURFACES.
4. THRUST BLOCKS ARE TO EXTEND TO UNDISTURBED GROUND. CONCRETE TO BE CLASS 'C', SECT. 725.

MINIMUM THRUST BLOCK AREA REQUIRED (YxW) (SQ. FT.)

PIPE SIZE	WATER PIPE	
	TEE, DEAD END, 90° BEND	45° & 22 1/2° BENDS
4" OR LESS	3	3
6"	4	3
8"	6	3
10"	10	5
12"	14	7
16"	24	12

DETAIL NO.

380



STANDARD DETAIL
ENGLISH

THRUST BLOCKS FOR WATER LINES

REVISED

DETAIL NO.

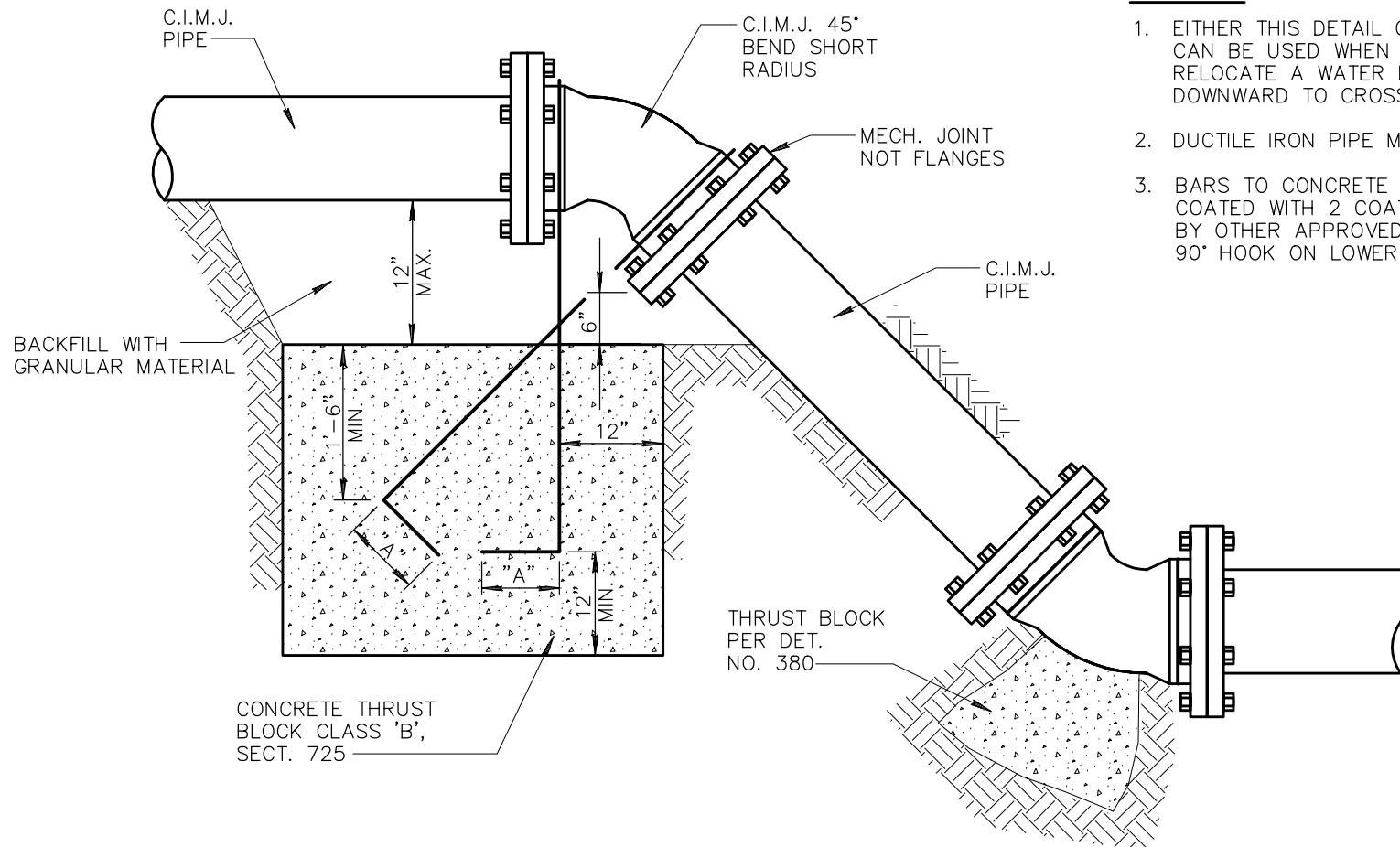
380

PIPE SIZE	MIN BAR SIZE	"A"—DIMENSION HOOK	MIN. * BLOCK DIM.
6"	#6	6"	3' x 3' x 3'
8"	#6	9"	4' x 4' x 2.5'
12"	#8	9"	4' x 4' x 5'

* FOR 125 P.S.I. WORKING PRESSURE.

NOTES:

1. EITHER THIS DETAIL OR RESTRAINT RODS CAN BE USED WHEN IT IS ALLOWED TO RELOCATE A WATER LINE UPWARD OR DOWNWARD TO CROSS A CONFLICT.
2. DUCTILE IRON PIPE MAY BE USED.
3. BARS TO CONCRETE THRUST BLOCK TO BE COATED WITH 2 COATS COAL TAR, EPOXY OR BY OTHER APPROVED METHOD. BARS TO HAVE 90° HOOK ON LOWER END, AS PER TABLE.



DETAIL NO.

381



STANDARD DETAIL
ENGLISH

ANCHOR BLOCKS FOR VERTICAL BENDS

REVISED

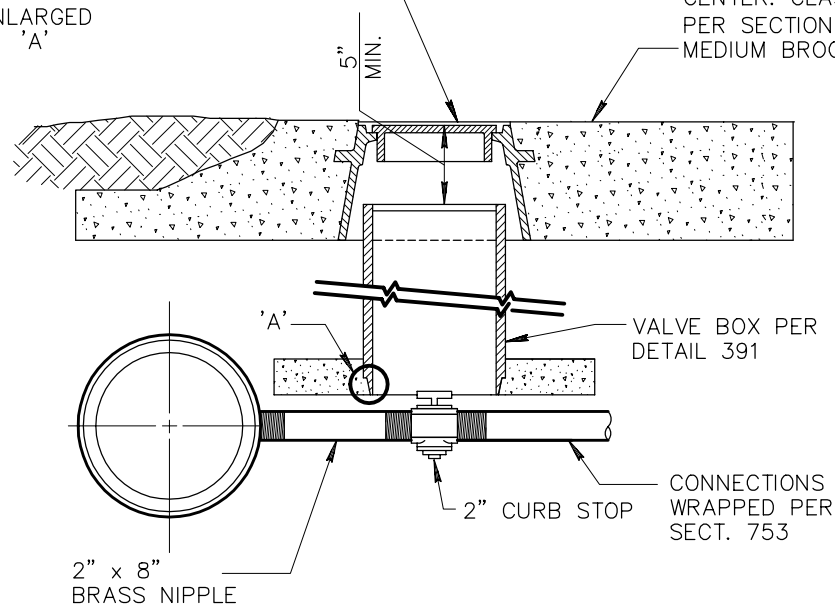
DETAIL NO.

381

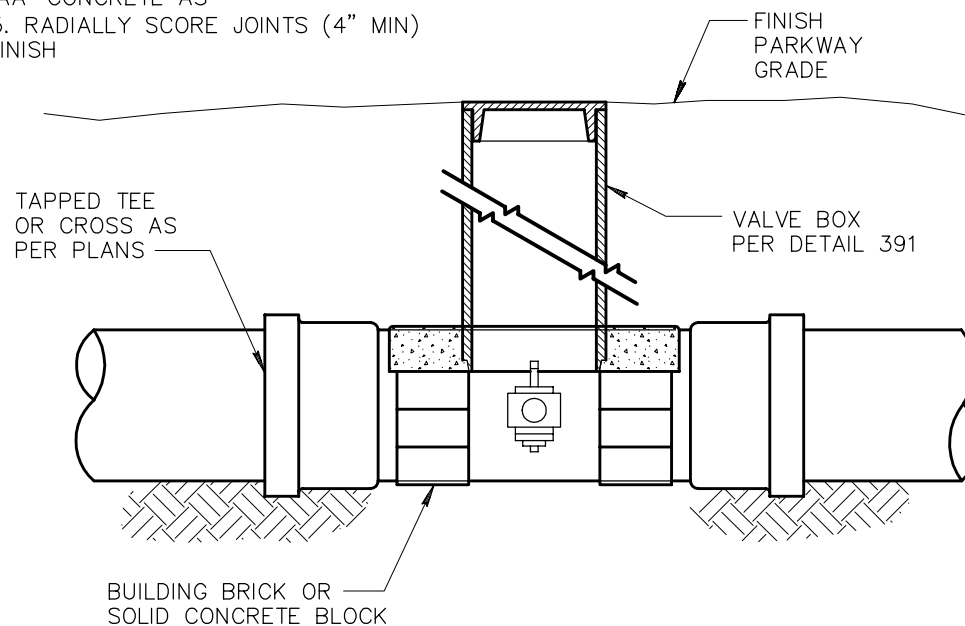


FRAME AND
COVER PER
DETAIL 270

POURED CONCRETE COLLAR 8" THICK
AND 40" SQUARE OR ROUND, VALVE BOX
CENTER. CLASS 'AA' CONCRETE AS
PER SECTION 725. RADIALLY SCORE JOINTS (4" MIN)
MEDIUM BROOM FINISH



TYPE 'A'



TYPE 'B'

NOTES:

1. CURB STOP TO BE MUELLER ORISEAL (H-10283), FORD BALL VALVE B11-777, HAYES BULLETIN 400, J. JONES (J-1900) OR APPROVED EQUAL.
2. REDUCER MAY BE USED WHEN CONNECTING TO SMALLER GALVANIZED PIPE.
3. THIS DETAIL IS TO BE USED WHEN CONNECTING EXISTING GALVANIZED PIPE TO ASBESTOS CEMENT PIPE OR CAST IRON PIPE.

NOTE:

1. VALVE BOX TO BE SUPPORTED ON BRICKS TO PREVENT VERTICAL LOADS FROM BEING TRANSMITTED TO THE SMALL PIPE.

DETAIL NO.

389



STANDARD DETAIL
ENGLISH

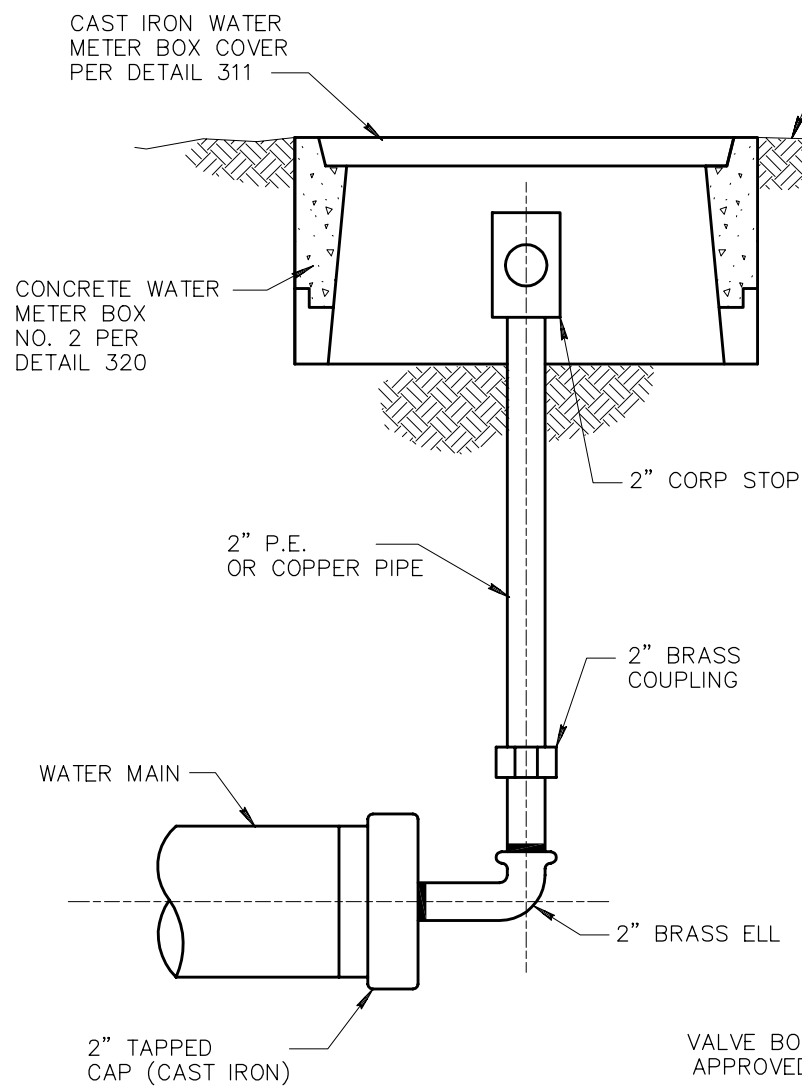
CURB STOP WITH VALVE BOX AND COVER

REVISED

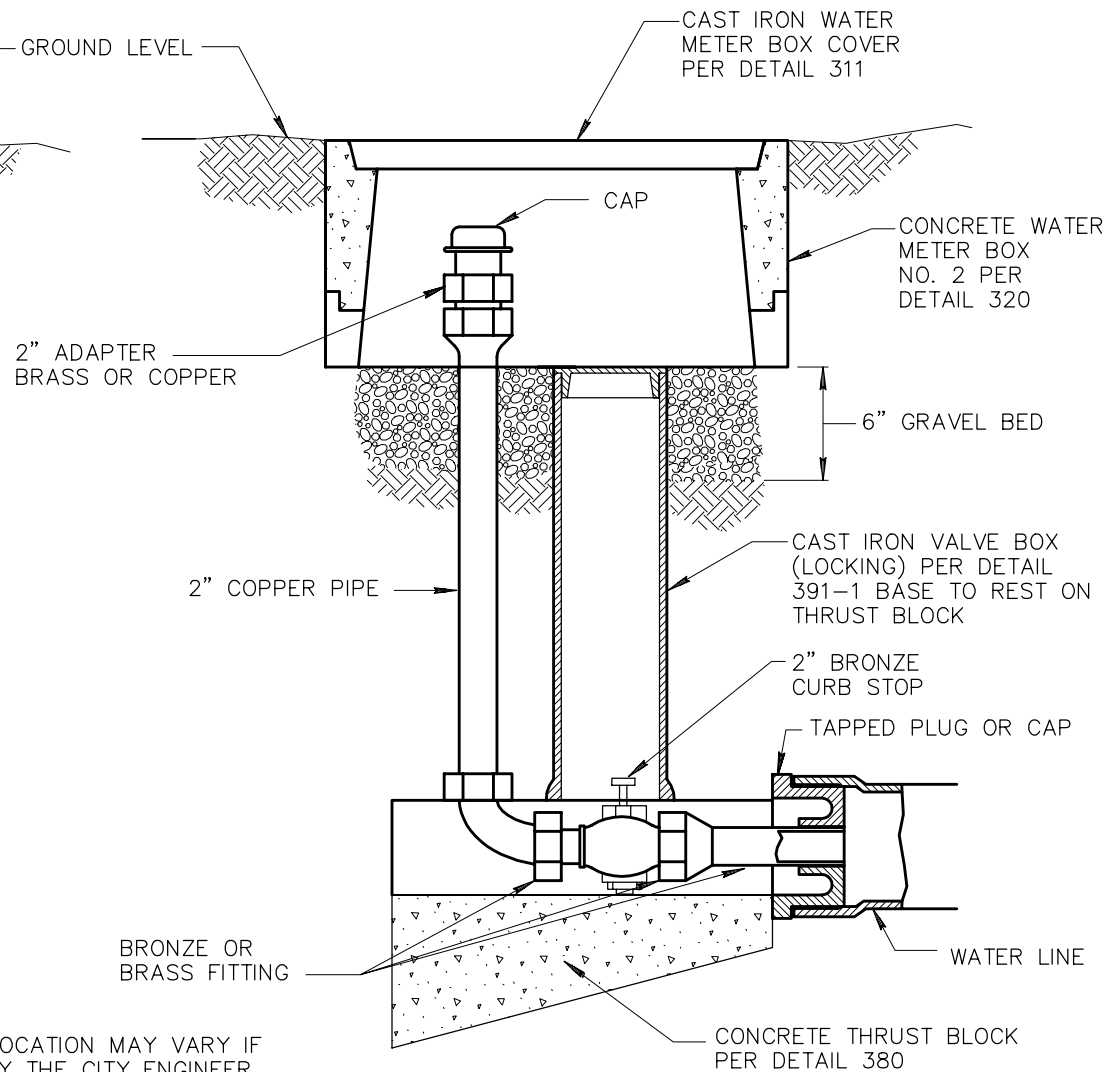
01-01-2001

DETAIL NO.

389



TYPE 'A'



TYPE 'B'

VALVE BOX LOCATION MAY VARY IF APPROVED BY THE CITY ENGINEER.

DETAIL NO.

390



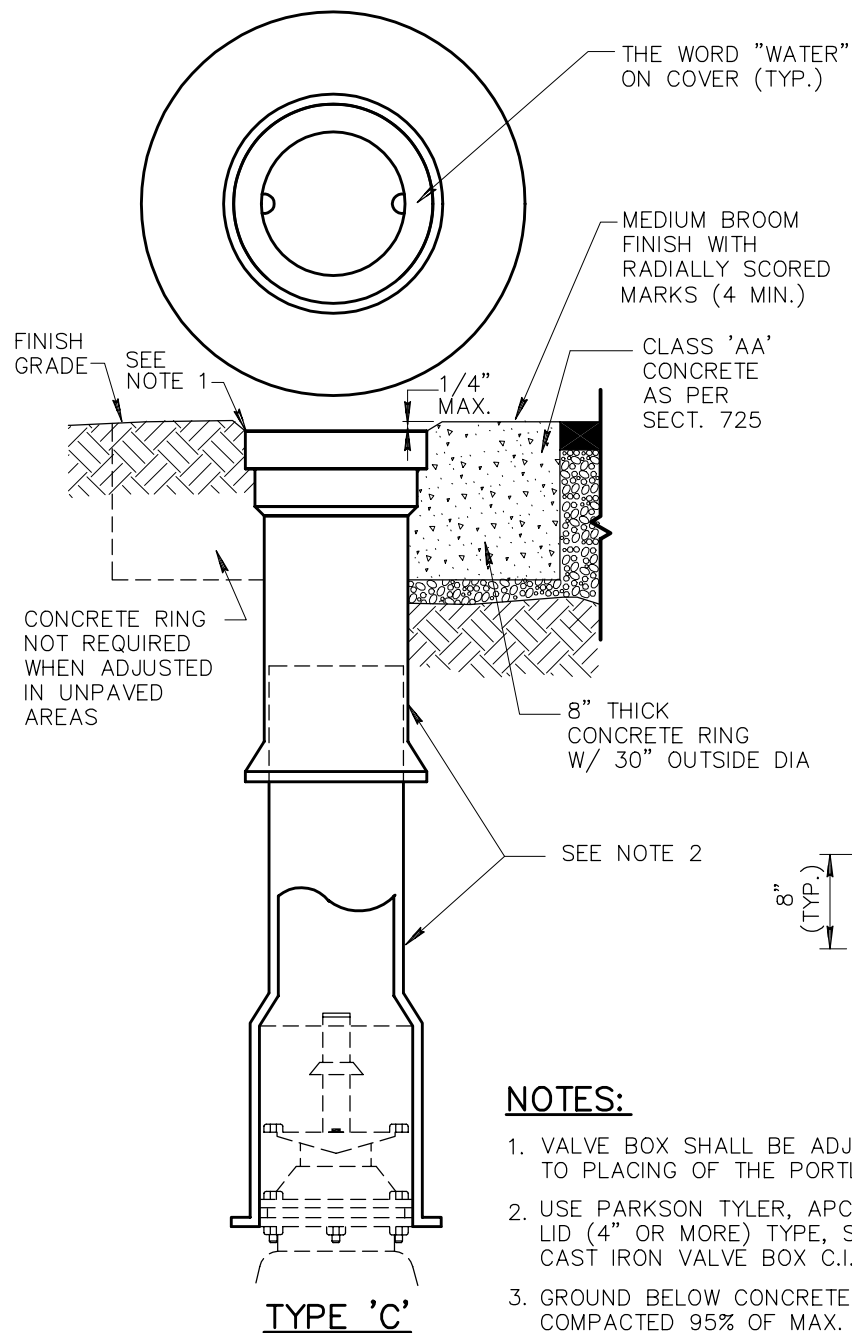
STANDARD DETAIL
ENGLISH

CURB STOP WITH FLUSHING PIPE

REVISED

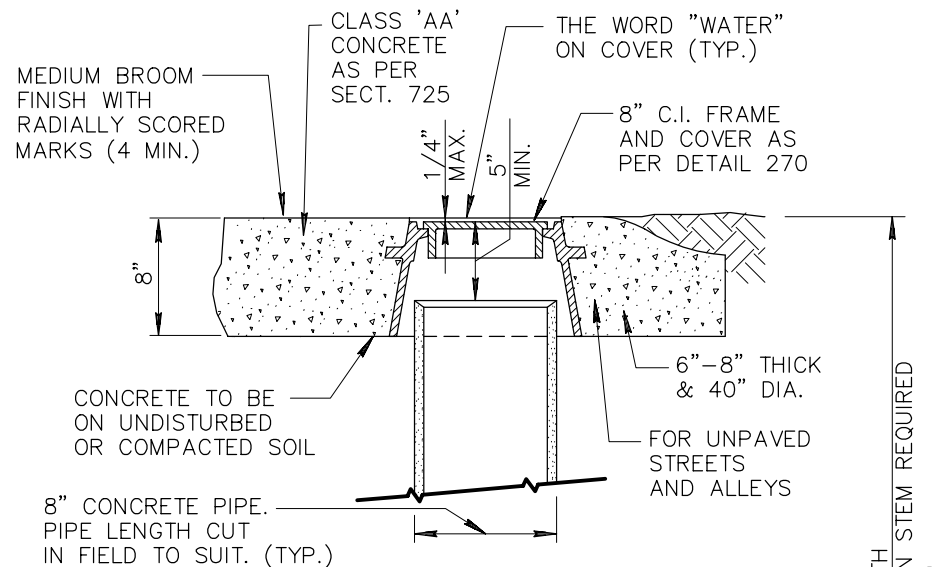
DETAIL NO.

390

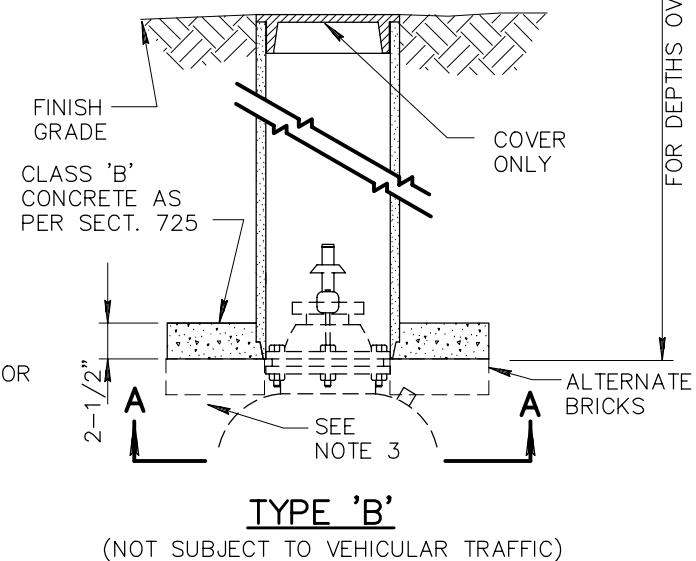


NOTES:

1. VALVE BOX SHALL BE ADJUSTED TO THE FINISHED GRADE PRIOR TO PLACING OF THE PORTLAND CEMENT CONCRETE SURFACE.
2. USE PARKSON TYLER, APCO OR EQUAL DEEP SKIRTED LID (4" OR MORE) TYPE, SLIDING ADJUSTABLE CAST IRON VALVE BOX C.I. MIN. T.S. 30,000 P.S.I.
3. GROUND BELOW CONCRETE PAD OR 3 BRICKS TO BE COMPACTED 95% OF MAX. DENSITY.



TYPE 'A'
(TO BE USED IN AREAS SUBJECT TO VEHICULAR TRAFFIC.)



TYPE 'B'
(NOT SUBJECT TO VEHICULAR TRAFFIC)

DETAIL NO.

391-1



STANDARD DETAIL
ENGLISH

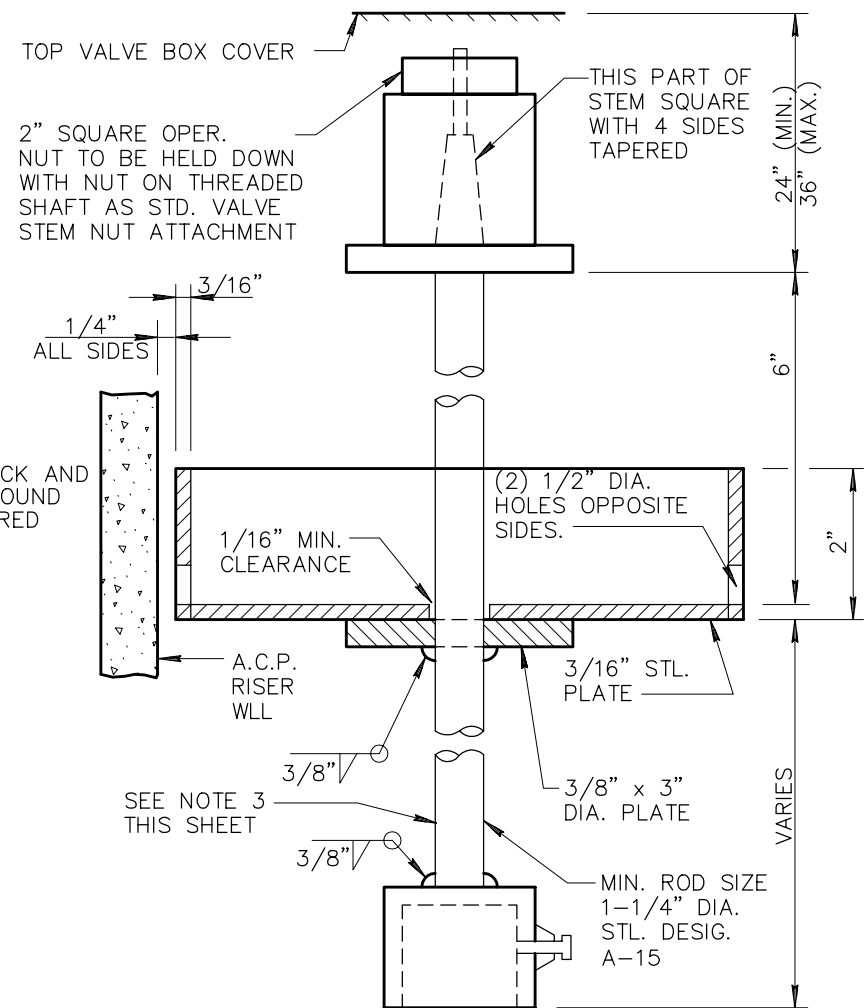
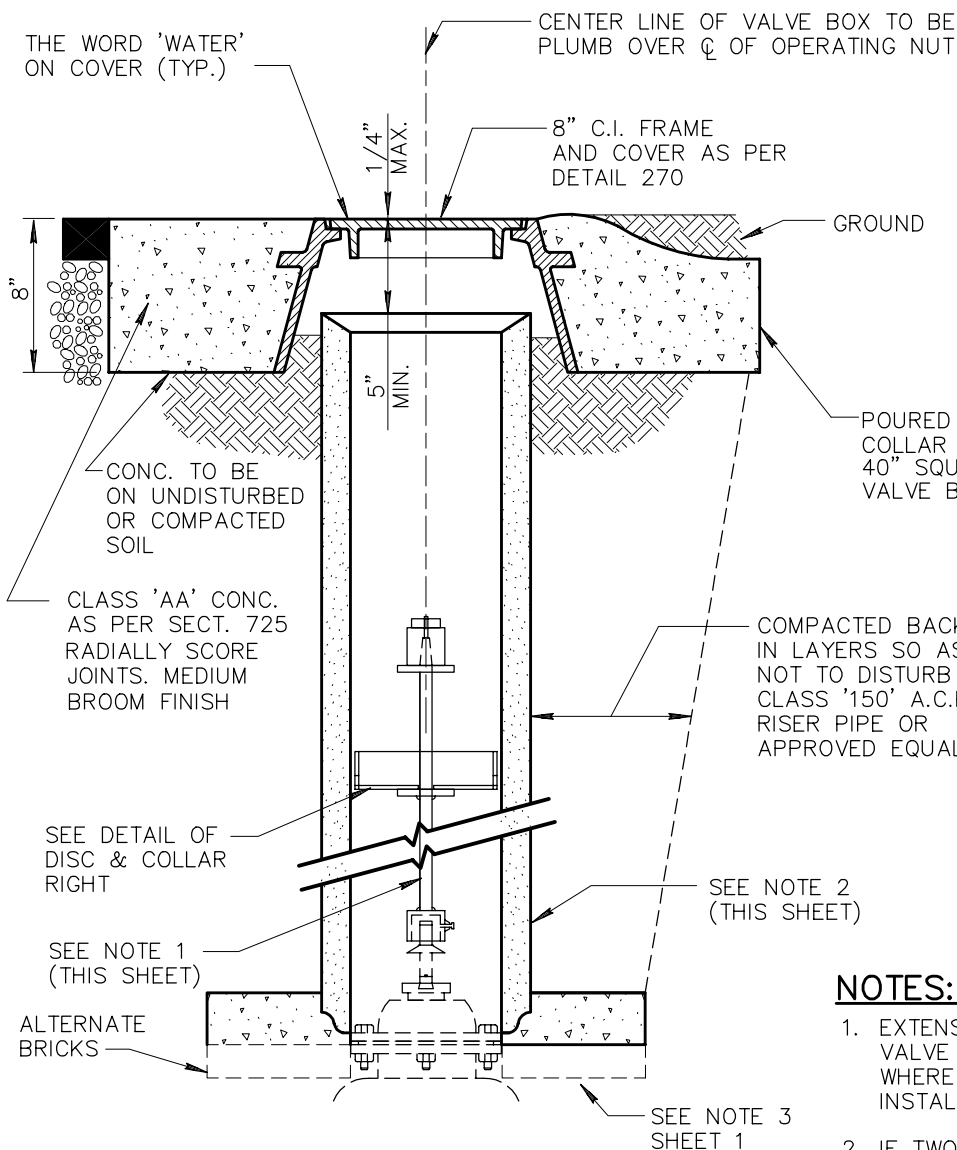
VALVE BOX INSTALLATION AND GRADE ADJUSTMENT

REVISED

01-01-2001

DETAIL NO.

391-1



NOTES:

1. EXTENSION STEM: WITH SQUARE SOCKET ON BOTTOM TO FIT 2" SQUARE VALVE NUT. EXTENSION TO VALVE STEMS REQUIRED ON ALL VALVES INSTALLED WHERE OPERATING NUT IS OVER 5' BELOW SURFACE. LENGTH TO FIT EACH INSTALLATION. OPERATING NUT TO BE HELD ON TOP OF EXTENSION WITH STOP NUT.
2. IF TWO OR MORE JOINTS OF A.C.P. ARE USED TO MAKE RISER, USE STANDARD A.C. PIPE RUBBER GASKET COUPLING TO JOIN PIPE. WHERE RISER LENGTH EXCEEDS 10' USE 12" A.C. PIPE.
3. STEM PAINTING: ALL STEEL TO HAVE PRIME COAT OF PAINT NO. 1-D AND ONE HEAVY APPLICATION (FINISH COAT) OF PAINT NO. 9 AS PER SECT. 790.

DETAIL NO.
391-2

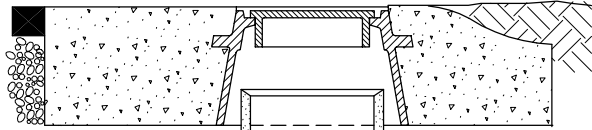


STANDARD DETAIL
ENGLISH

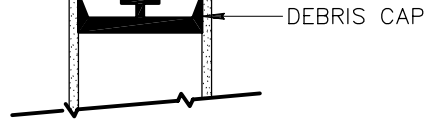
VALVE BOX INSTALLATION AND GRADE ADJUSTMENT

REVISED
01-01-2001

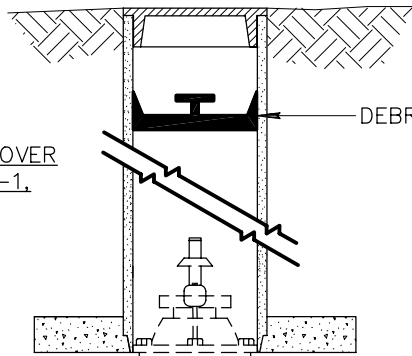
DETAIL NO.
391-2



VALVE BOX AND COVER
FOR DETAIL 391-1,
TYPE A

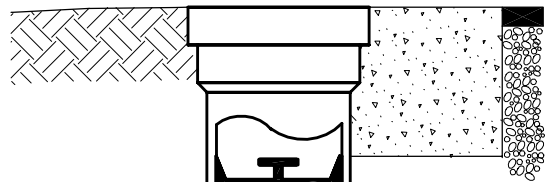


TYPE 'A'



VALVE BOX AND COVER
FOR DETAIL 391-1,
TYPE B

TYPE 'B'



VALVE BOX AND COVER
FOR DETAIL 391-1,
TYPE C



TYPE 'C'

NOTES:

1. THE DEBRIS CAP SHALL BE DESIGNED AND INSTALLED TO PREVENT DEBRIS SUCH AS DIRT, DUST SAND, ETC., FROM PASSING AROUND THE CAP AND DOWN INTO THE VALVE HOUSING. THE CAP SHALL BE HELD IN PLACE BY A MECHANISM WHICH WILL NOT DAMAGE THE VALVE HOUSING. ONCE INSTALLED THE CAP MUST WITHSTAND, WITHOUT SLIPAGE, A MINIMUM VERTICAL FORCE OF 50 POUNDS AT A LOADING RATE OF 1 INCH/MINUTE.
2. THE CAP SHALL BE MANUFACTURED OF CORROSIVE RESISTANT MATERIALS.
3. DEBRIS CAP SHALL BE INSTALLED AS CLOSE UNDER THE CAST IRON COVER WITHOUT INTERFERING WITH COVER OPERATION.
4. THE CAP SHALL BE CAPABLE OF SECURELY HOLDING A STANDARD LOCATING COIL, "SCOTCH MARK" 4 DISK MARKER BY 3M OR EQUAL.
5. THE CAP SHALL BE CONSTRUCTED TO ALLOW THE DEVICE TO BE SECURED BY A LOCK. THE LOCK (PAD, BARREL, ETC.) SHALL BE SUPPLIED BY THE AGENCY.
6. THE HANDLE AND/OR BODY OF THE CAP SHALL BE INTEGRALLY COLORED IF REQUIRED BY THE AGENCY. IF REQUIRED, THE COLOR SHALL CONFORM TO THE ONE CALL LOCATING SERVICE (BLUE STAKE) COLORS (ARS 40-360.21).
7. THE CAP SHALL BE INSTALLED IN ALL VALVE HOUSINGS AS REQUIRED BY THE CONTRACT DOCUMENTS OR BY THE AGENCY'S POLICIES.
8. THE DEBRIS CAP SHALL BE MANUFACTURED BY SW SERVICES, INC. PHOENIX, ARIZONA OR EQUAL.

DETAIL NO.

392



STANDARD DETAIL
ENGLISH

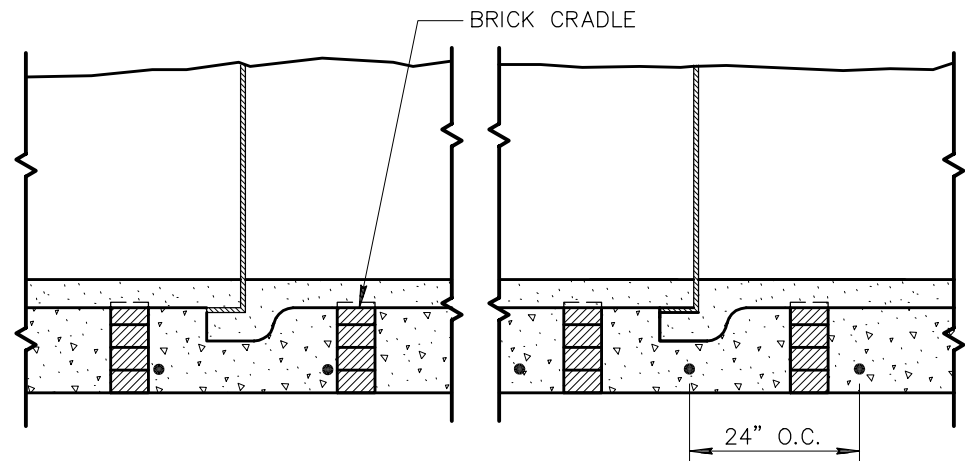
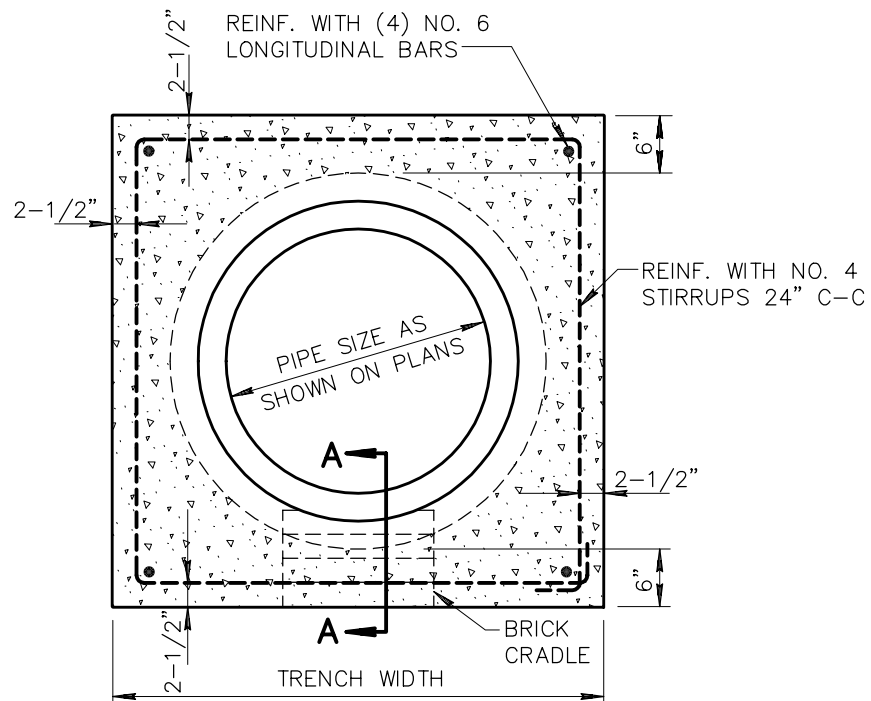
DEBRIS CAP INSTALLATION

REVISED

01-01-2001

DETAIL NO.

392



SECTION A-A

NOTES:

1. LAY PIPE TO LINE AND GRADE ON BRICK CRADLE.
2. PLACE CLASS 'C' CONCRETE PER SECT. 725 & 505, IN SUCH A MANNER AS NOT TO FLOAT THE PIPE.

DETAIL NO.

402



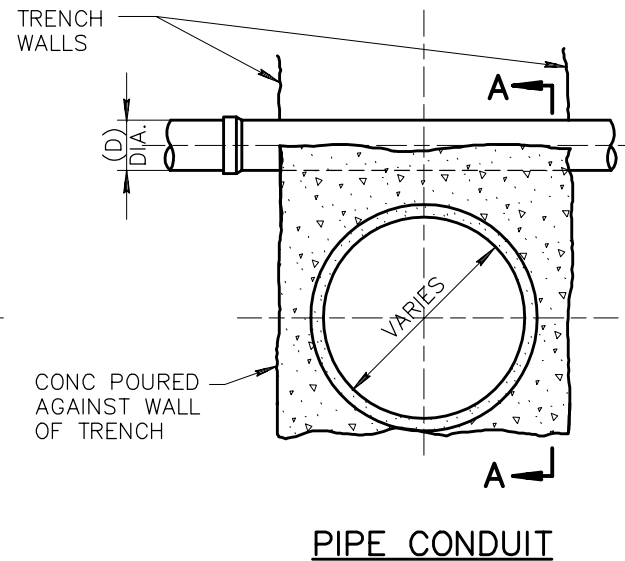
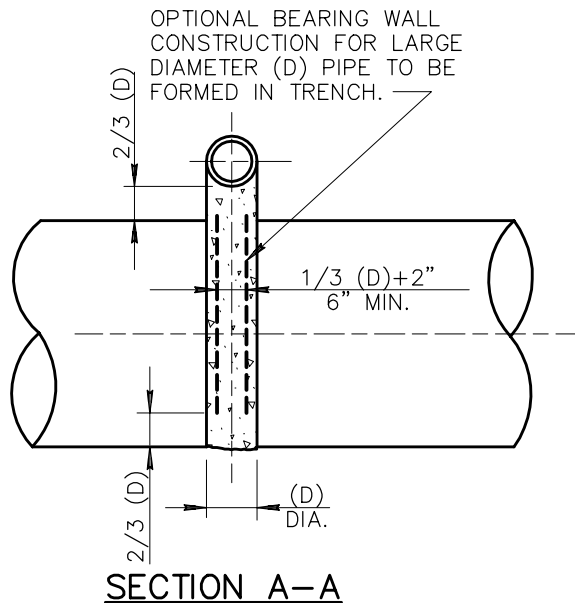
STANDARD DETAIL
ENGLISH

ENCASED PIPE FOR CANAL CROSSINGS

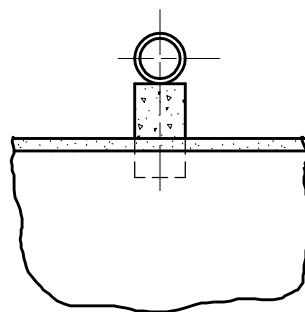
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DETAIL NO.

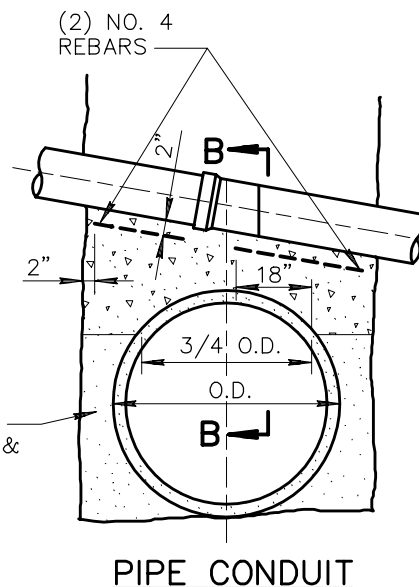
402



TYPE 'A'



SECTION B-B



TYPE 'B'

NOTES:

1. TYPE 'A' PIPE SUPPORT MAY BE USED FOR ANY TYPE CROSSING CONDITION.
2. TYPE 'C' PIPE SUPPORT MAY BE USED FOR CROSSING PIPES WITH A BELL DIAMETER OF 18" OR LESS IF SUFFICIENT CLEARANCE OVER STORM SEWER IS AVAILABLE AND TOTAL SPAN IS LESS THAN 34'
3. INTERMEDIATE PIPE SUPPORT SHALL BE USED IN CONJUNCTION WITH TYPE 'C' PIPE SUPPORT IF TOTAL SPAN EXCEEDS MAX. 'W' IN TABLE.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING ALL SUPPORTS BOTH PERMANENT AND TEMPORARY. TEMPORARY SUPPORTS SHALL NOT BE A SEPARATE PAY ITEM.
5. PERMANENT PIPE SUPPORTS MAY BE DECREASED FROM PLAN QUANTITIES OR EXTENDED TO INCLUDE SOME LISTED BELOW AS TEMPORARY SUPPORTS IF CONDITIONS WARRANT THESE CHANGES AT THE TIME OF CONSTRUCTION. DECISION SHALL BE MADE BY THE ENGINEER.
6. WHEN TYPE 'A' PIPE SUPPORT IS USED AND WHENEVER SO DIRECTED BY THE ENGINEER, THE CONTRACTOR SHALL PIERCE THE WALL WITH SUITABLE OPENINGS TO PREVENT UNEQUAL PRESSURE RESULTING FROM FLOODING OF THE BACKFILL. THE VOLUME OF THE PIERCED OPENING SHALL NOT EXCEED 1/2 THE VOLUME OF THE SUPPORTING WALL.
7. USE TYPE 'B' PIPE SUPPORT INSTEAD OF TYPE 'C' WHEN CLEARANCE IS LESS THAN 'Y' IN TABLE, BETWEEN PIPES.
8. CLASS 'A' CONCRETE AS PER SECT. 725 UNLESS OTHERWISE NOTED.

SCHEDULE OF REQUIRED SUPPORTS

PERMANENT	TEMPORARY
SEWER LINES	CAST IRON PIPE
OTHER UTILITIES AS NOTED ON THE PLANS OR AS REQUIRED BY THE ENGINEER AT TIME OF CONSTRUCTION.	CONC. IRRIG. PIPE
	BURIED TELCO.
	GAS PIPES
	CONC. STORM DRAIN
	CONC. BOX CULVERT
	TRAFFIC CONTROL CONDUIT
	WATER & SEWER LINES

DETAIL NO.

403-1



STANDARD DETAIL
ENGLISH

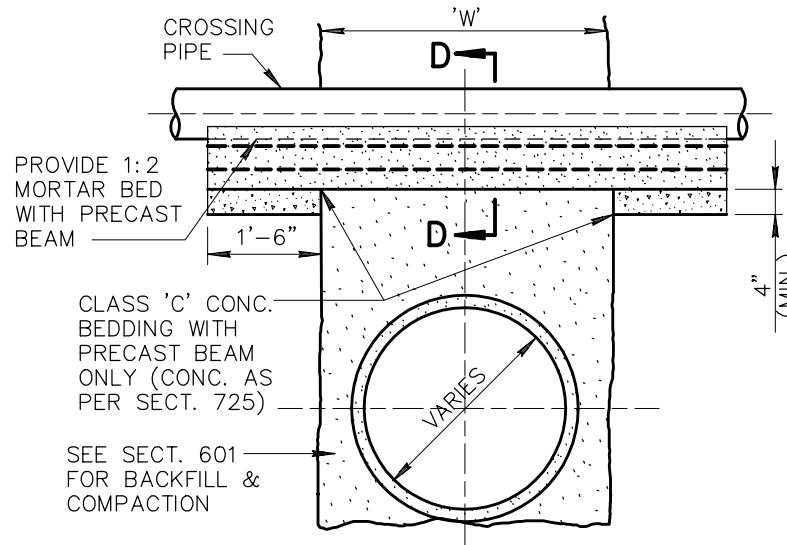
PIPE SUPPORT ACROSS TRENCHES

REVISED

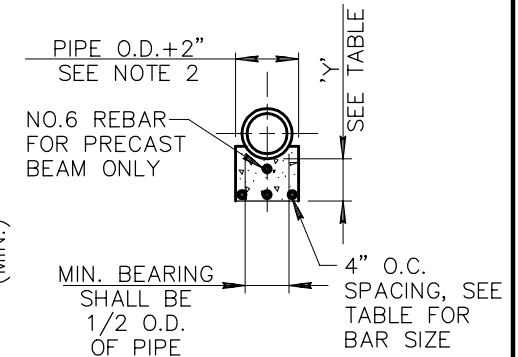
DETAIL NO.

403-1

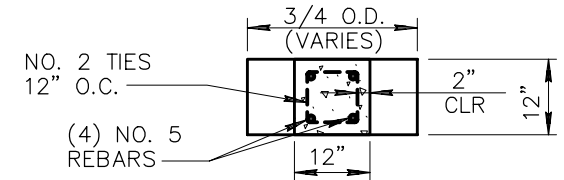
TABLE				
'W'	DEPTH OF COVER ON SUPPORTS			
	0' TO 8'		8' TO 16'	
	BAR NO.	Y	BAR NO.	Y
TO 6'	5	8"	6	11"
7'	5	9"	6	12"
8'	5	10"	6	13"
9'	6	11"	6	14"
10'	6	12"	7	15"
11'	6	13"	7	16"
12'	6	14"	7	17"
13'	7	15"	7	19"
14'	7	16"	8	20"
15'	7	17"	8	21"
16'	7	18"		
17'	8	19"		



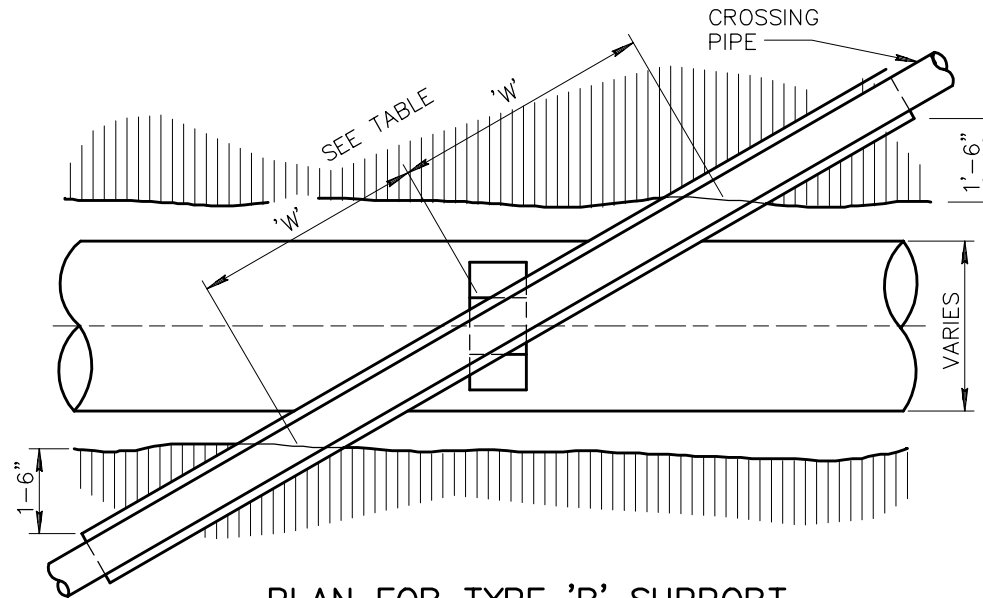
TYPE 'C'



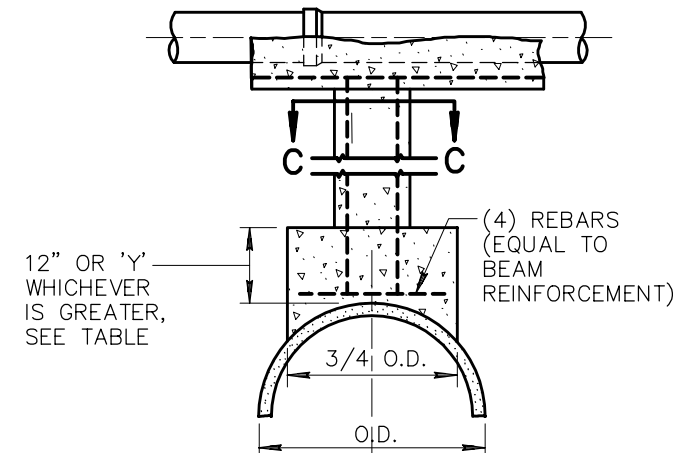
SECTION D-D



SECTION C-C



PLAN FOR TYPE 'B' SUPPORT



INTERMEDIATE SUPPORT FOR TYPE 'B' CROSSINGS

DETAIL NO.
403-2

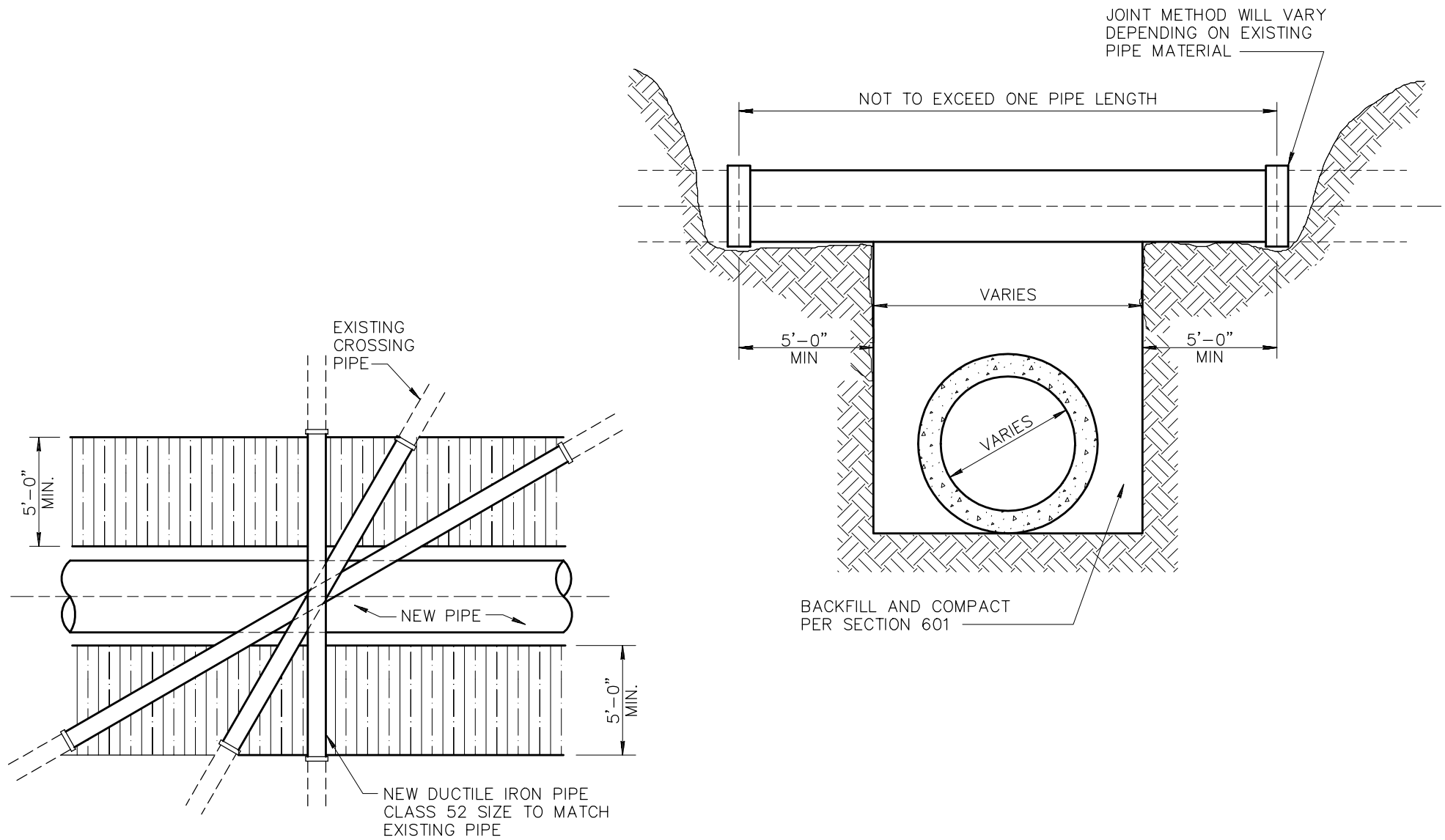


STANDARD DETAIL
ENGLISH

PIPE SUPPORTS ACROSS TRENCHES

REVISED

DETAIL NO.
403-2



DETAIL NO.
403-3



STANDARD DETAIL
ENGLISH

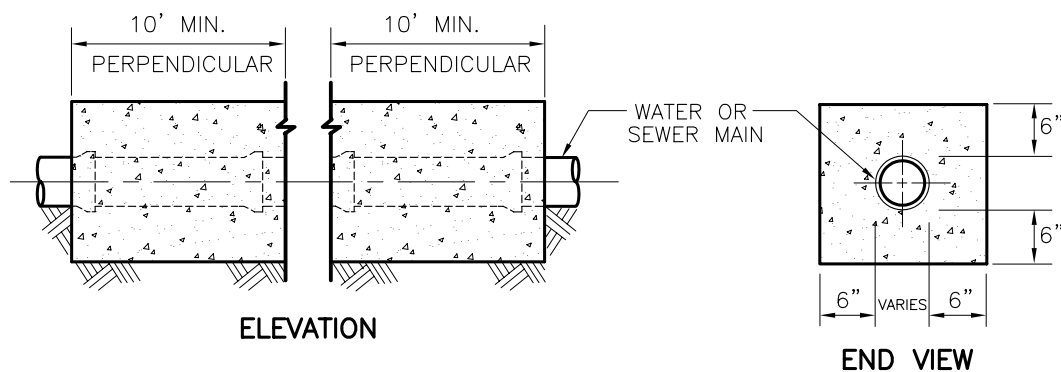
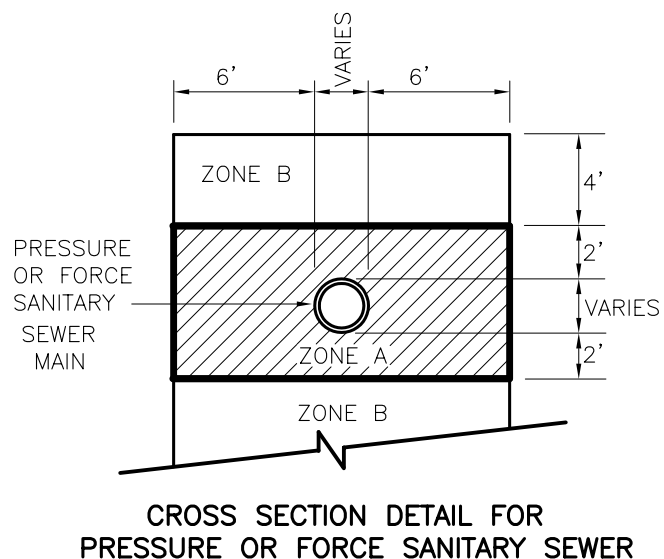
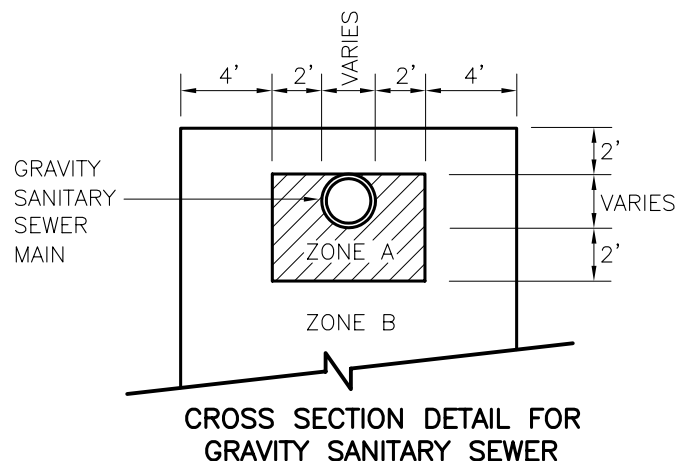
ALTERNATE TO PIPE SUPPORT

REVISED

DETAIL NO.
403-3

NOTES:

1. SEPARATION DISTANCES AND/OR OTHER EXTRA PROTECTION SHALL BE REQUIRED TO PROTECT WATER MAINS FROM CONTAMINATION BY SANITARY SEWER MAINS.
2. THIS CRITERIA APPLIES TO PARALLEL MAINS AS WELL AS CROSSINGS.
3. SEE CROSS SECTION DETAIL FOR LIMITS OF SEPARATION/EXTRA PROTECTION. ALL DISTANCES ARE MEASURED PERPENDICULARLY FROM THE OUTSIDE OF THE PIPES.
 - A. NO WATER MAINS SHALL FALL WITHIN ZONE A.
 - B. EXTRA PROTECTION WILL BE REQUIRED WHEN THE WATER MAIN FALLS WITHIN ZONE B. EXTRA PROTECTION SHALL CONSIST OF CONSTRUCTING THE SANITARY SEWER MAIN WITH MECHANICAL JOINT OR RESTRAINED JOINT DUCTILE IRON PIPE FOR A DISTANCE OF TEN FEET ON EITHER SIDE OF THE WATER MAIN. THE DUCTILE IRON PIPE SHALL COMPLY WITH THE AGENCY'S REQUIREMENTS FOR SEWER INSTALLATION. IN THE CASE OF A CROSSING, THE NUMBER OF JOINTS SHALL BE HELD TO A MINIMUM WITH ONE FULL JOINT OF PIPE CENTERED OVER/UNDER THE OTHER. AN ALTERNATE PROTECTION MAY CONSIST OF ENCASING BOTH PIPES IN CONCRETE AS SHOWN HEREIN.
 - C. NO ADDITIONAL PROTECTION WILL BE REQUIRED OUTSIDE OF THE ZONE A AND B.
4. SEPARATION REQUIREMENTS FOR 4" OR 6" INDIVIDUAL HOUSE SERVICE CONNECTIONS SHALL COMPLY WITH THE AGENCY'S PLUMBING CODES.
5. RECLAIMED WATER SHALL BE CONSIDERED AS POTABLE WATER WHEN PLACED NEXT TO A SANITARY SEWER AND CONSIDERED A PRESSURE OR FORCE SANITARY SEWER MAIN, WHEN PLACED NEXT TO A POTABLE WATER MAIN.
6. CLASS 'C' CONCRETE AS PER SECTION 725.



ENCASEMENT FOR PARALLEL PIPES

DETAIL NO.

404-1



STANDARD DETAIL
ENGLISH

WATER AND SANITARY SEWER SEPARATION/PROTECTION

REVISED

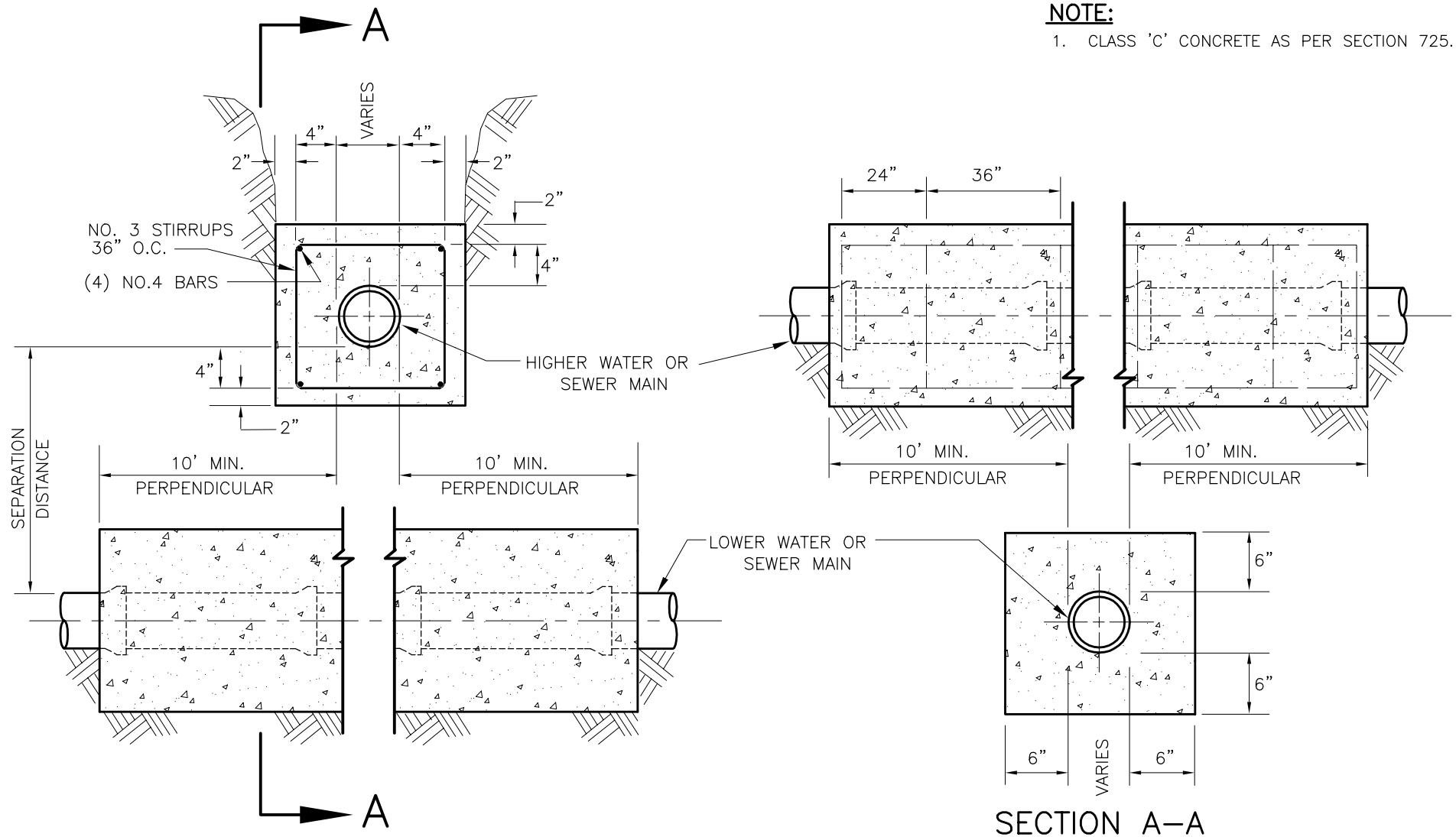
01-03-2002

DETAIL NO.

404-1

NOTE:

1. CLASS 'C' CONCRETE AS PER SECTION 725.



ENCASEMENT FOR PIPE CROSSING

DETAIL NO.
404-2

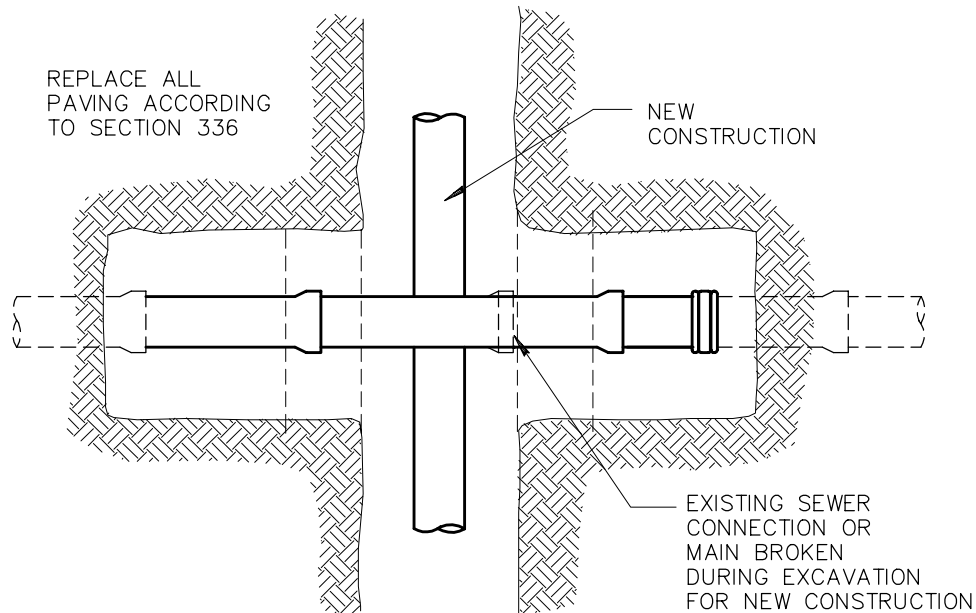


STANDARD DETAIL
ENGLISH

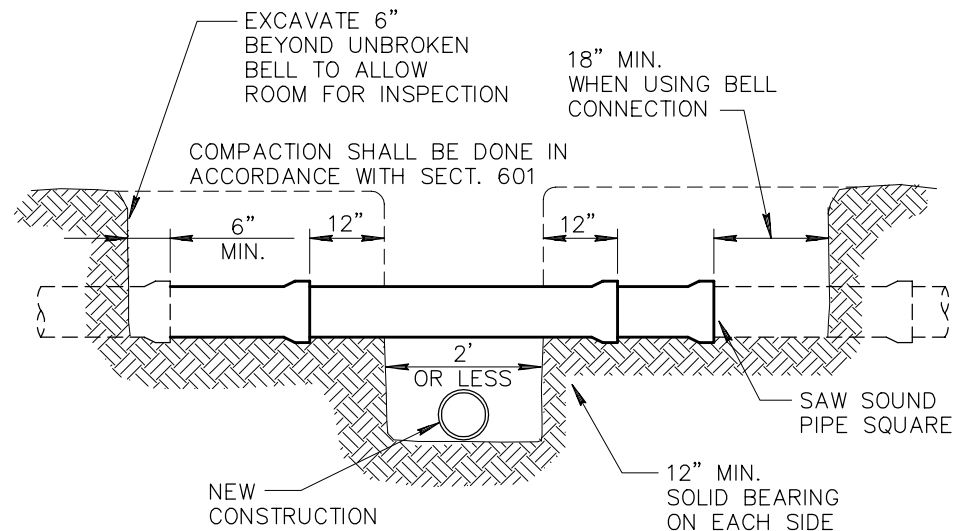
**WATER AND SANITARY SEWER
SEPARATION/PROTECTION**

REVISED

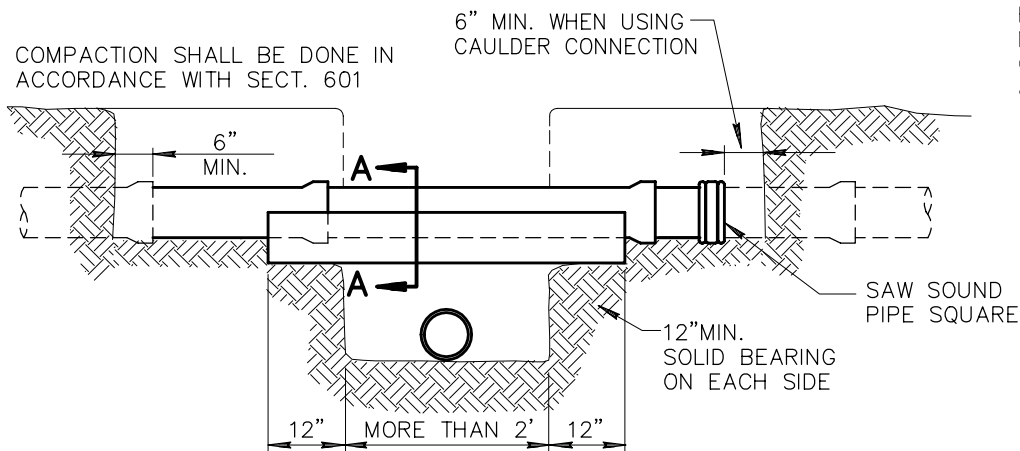
DETAIL NO.
404-2



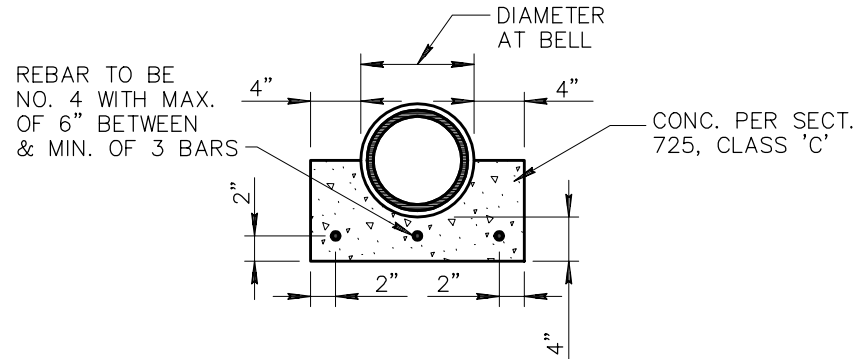
PLAN VIEW OF REPLACEMENT



REPLACEMENT WHEN NEW TRENCH 2' WIDE OR LESS



REPLACEMENT WHEN NEW TRENCH MORE THAN 2' WIDE



SECTION 'A-A'

NOTES:

1. BROKEN PIPE SHALL BE REPLACED WITH A MINIMUM OF ONE FULL JOINT AND TWO SHORT LENGTHS WITH UNBROKEN BELLS. CONSTRUCTION AND JOINTS TO BE MADE AS PER SECTION 615.

DETAIL NO.

405



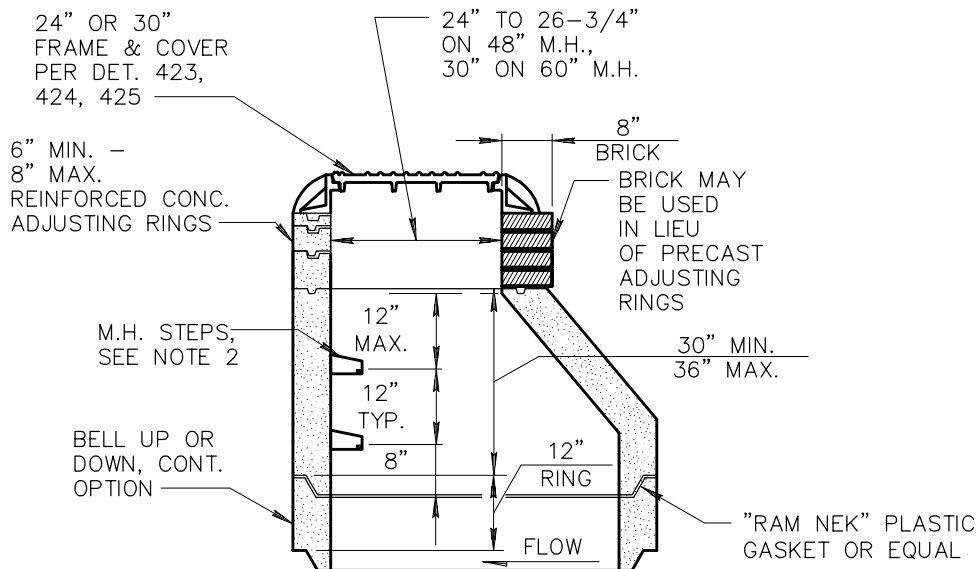
STANDARD DETAIL
ENGLISH

BROKEN SEWER LINE REPLACEMENT

REVISED

DETAIL NO.

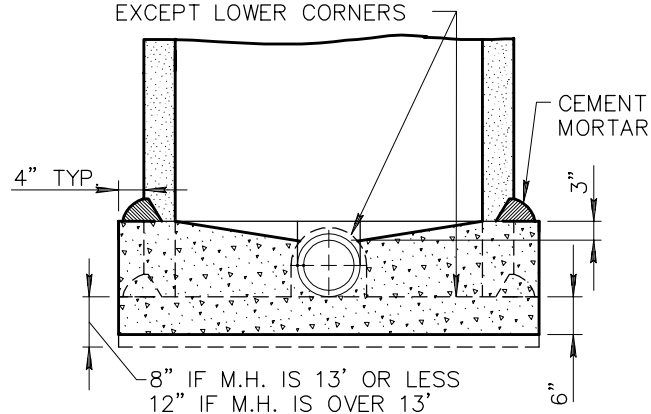
405



TYPE 'A' TOP

(PRE-CAST ECCENTRIC CONICAL TOP M.H.)

** ALTERNATE BASE
WITH KNOCKOUTS FOR PIPES.
CLEARANCE AROUND PIPES
1\"/>



NOTES:

1. PRE-CAST, REINFORCED M.H. SECTIONS SHALL BE MANUFACTURED IN ACCORDANCE WITH A.S.T.M. C-478 EXCEPT AS MODIFIED HEREIN.
2. M.H. STEPS SHALL BE INSTALLED AT SITE OF M.H. SECTION MANUFACTURE. MINIMUM CLEARANCE EACH SIDE OF M.H. LEG SHALL BE 1\"/>
3. USE LOW ALKALI CEMENT ONLY.

DETAIL NO.

420-1



STANDARD DETAIL
ENGLISH

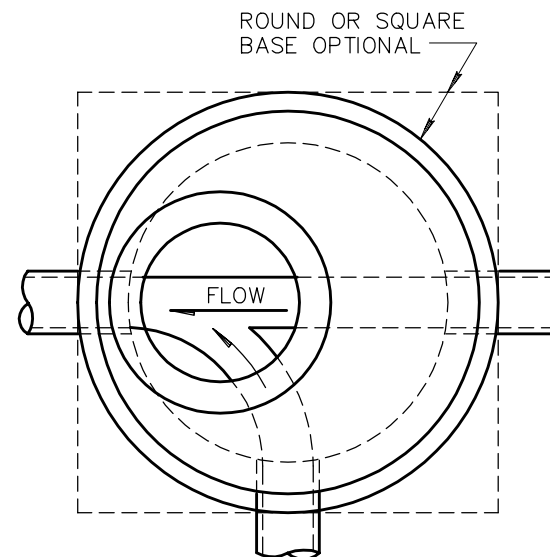
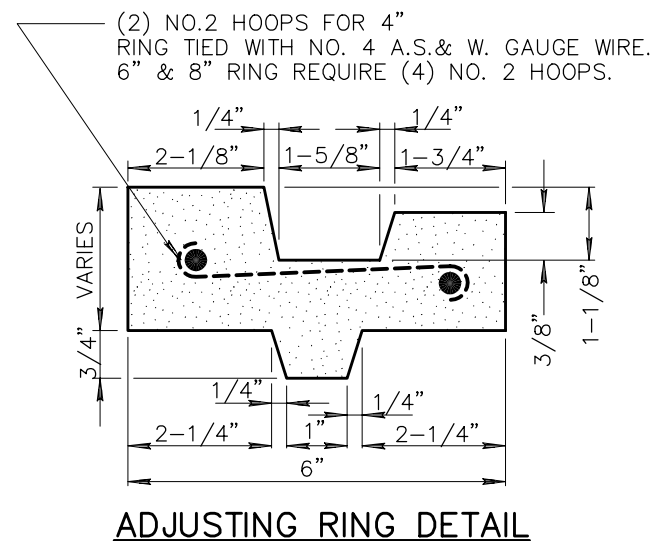
PRE-CAST CONCRETE SEWER MANHOLE

REVISED

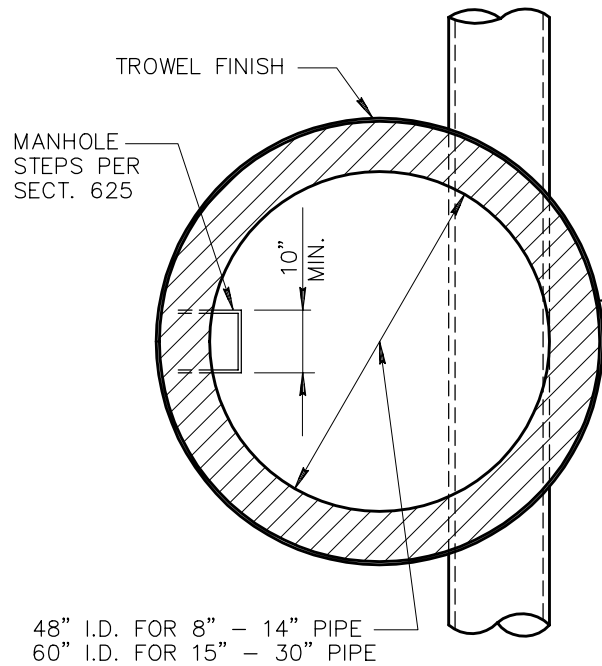
01-01-2004

DETAIL NO.

420-1



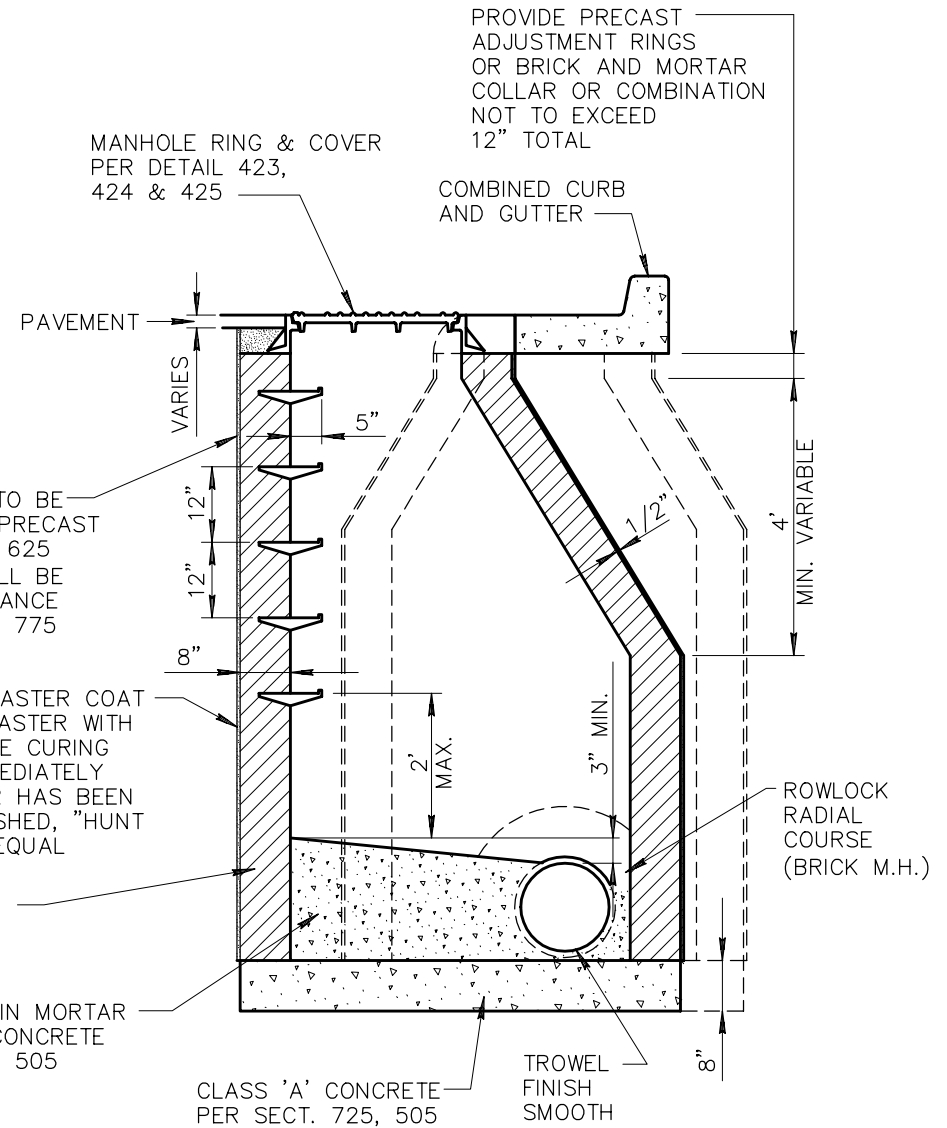
PIPE SIZE & ELEVATION
AS SHOWN ON PLANS



MANHOLE TO BE
BRICK OR PRECAST
PER SECT. 625
BRICK SHALL BE
IN ACCORDANCE
WITH SECT. 775

1:3 CEMENT PLASTER COAT
OUTSIDE OF PLASTER WITH
MEMBRANE TYPE CURING
COMPOUND IMMEDIATELY
AFTER PLASTER HAS BEEN
PLACED & FINISHED, "HUNT
PROCESS" OR EQUAL

COURSE BRICK IN MORTAR
OR CLASS 'C' CONCRETE
PER SECT. 725, 505



DETAIL NO.

421



STANDARD DETAIL
ENGLISH

OFFSET MANHOLE 8" TO 30" PIPE

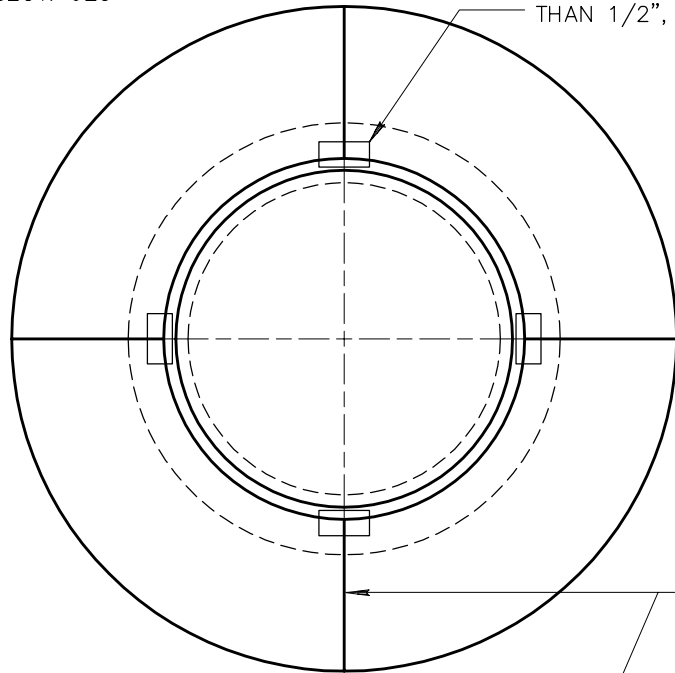
REVISED

DETAIL NO.

421

M.H. FRAME AND
COVER PER
SECT. 625

FOUR STEEL SPACERS, 4"x2"
THICKNESS AS REQUIRED FROM
1/2" to 2" WHEN
THICKNESS IS LESS THAN 1/2"
USE MORTAR, WHEN GREATER
THAN 1/2", USE BRICK.



MEDIUM BROOM
FINISH WITH RADIALLY
SCORED MARKS (4 MIN.)

EXISTING OR RECENTLY
INSTALLED PAVEMENT

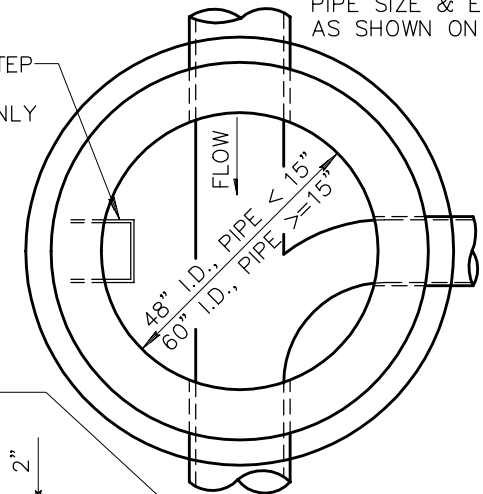
M.H. WALL THICKNESS
AND MATERIAL VARIES

SUBGRADE PREPARATION TO CONFORM
TO SECT. 301 OR 601

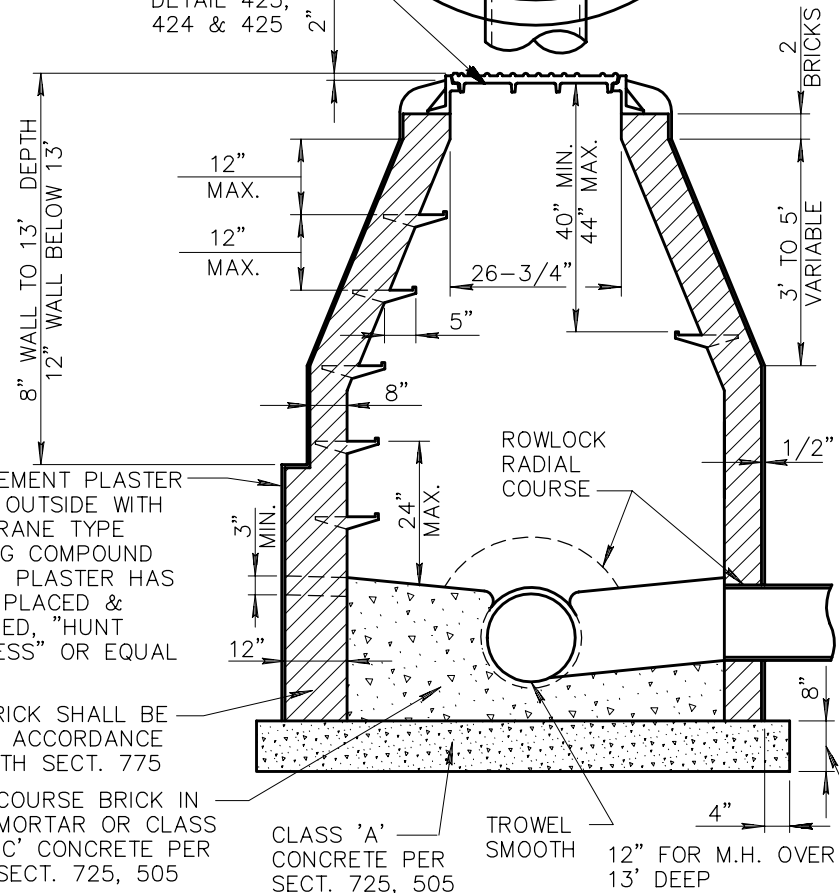
CLASS 'AA'
CONCRETE AS
PER SECT. 725, 505

M.H. STEP
IS 48"
M.H. ONLY

PIPE SIZE & ELEVATION
AS SHOWN ON PLANS



M.H. RING &
COVER STD.
DETAIL 423,
424 & 425



1:3 CEMENT PLASTER
COAT OUTSIDE WITH
MEMBRANE TYPE
CURING COMPOUND
AFTER PLASTER HAS
BEEN PLACED &
FINISHED, "HUNT
PROCESS" OR EQUAL

BRICK SHALL BE
IN ACCORDANCE
WITH SECT. 775

COURSE BRICK IN
MORTAR OR CLASS
'C' CONCRETE PER
SECT. 725, 505

CLASS 'A'
CONCRETE PER
SECT. 725, 505

TROWEL
SMOOTH

12" FOR M.H. OVER
13' DEEP

DETAIL NO.

422



STANDARD DETAIL
ENGLISH

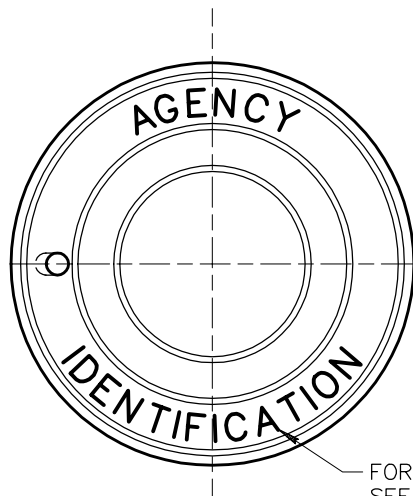
BRICK SEWER MANHOLE AND COVER FRAME ADJUSTMENT

REVISED

01-01-2001

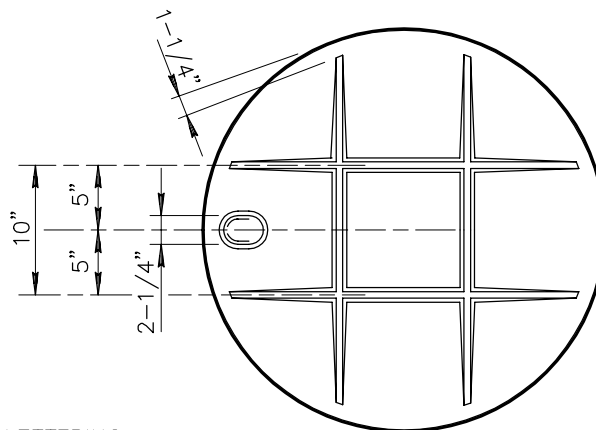
DETAIL NO.

422

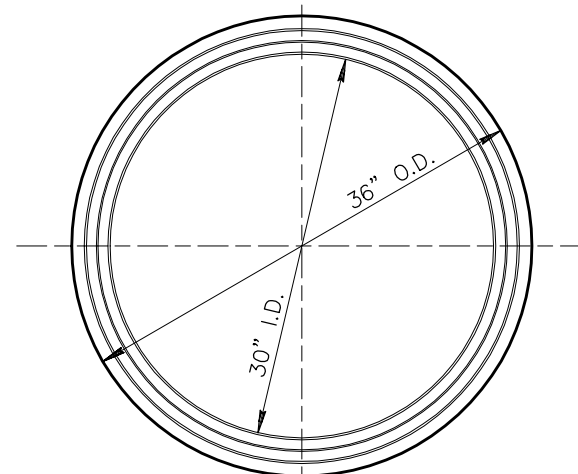


FOR COVER LETTERING
SEE NOTE ON DETAIL 424

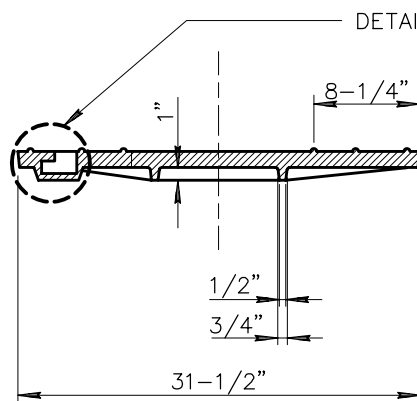
FACE OF COVER
CAST IRON



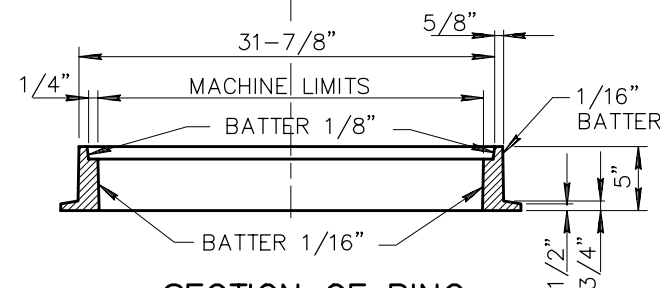
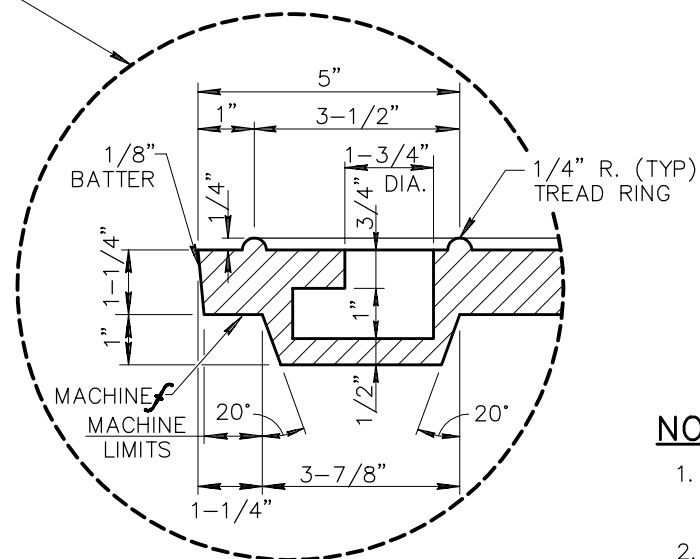
BACK OF COVER



CAST IRON
MANHOLE RING



SECTION OF COVER
APPROX. WEIGHT 276 LBS.



SECTION OF RING
APPROX. WEIGHT 210 LBS.

NOTES:

1. WEIGHT OF CASTING SHALL BE NO MORE THAN 2% LESS THAN THE APPROXIMATE WEIGHT SPECIFIED.
2. CASTINGS SHALL CONFORM TO SECT. 787.

DETAIL NO.

423



STANDARD DETAIL
ENGLISH

WATER TIGHT 30"
MANHOLE FRAME AND COVER

REVISED

DETAIL NO.

423



24" MANHOLE FRAME AND COVER



LETTERING ON MANHOLE COVER TO CONTAIN NAME OF AGENCY AND UTILITY FOR WHICH MANHOLE IS NEEDED, (I.E. "PHOENIX SANITARY SEWER"), OR AS DIRECTED. THE TOTAL WIDTH OF INDIVIDUAL LETTERS TO BE SUCH THAT LETTERS AND WORDS ARE EQUALLY SPACED AND BALANCED TO FORM A COMPLETE CIRCLE WITH SPACERS BEFORE AND AFTER THE WORD IDENTIFYING THE AGENCY INVOLVED. LETTERS TO BE 2" IN HEIGHT AND RAISED 1/8" ABOVE LEVEL OF COVER. TYPE OF LETTERS TO BE SUBMITTED FOR APPROVAL. WEIGHT OF CASTINGS SHALL BE NO MORE THAN 2% LESS THAN THE APPROXIMATE WEIGHT SPECIFIED. CASTINGS SHALL CONFORM TO SECTION 787.

424

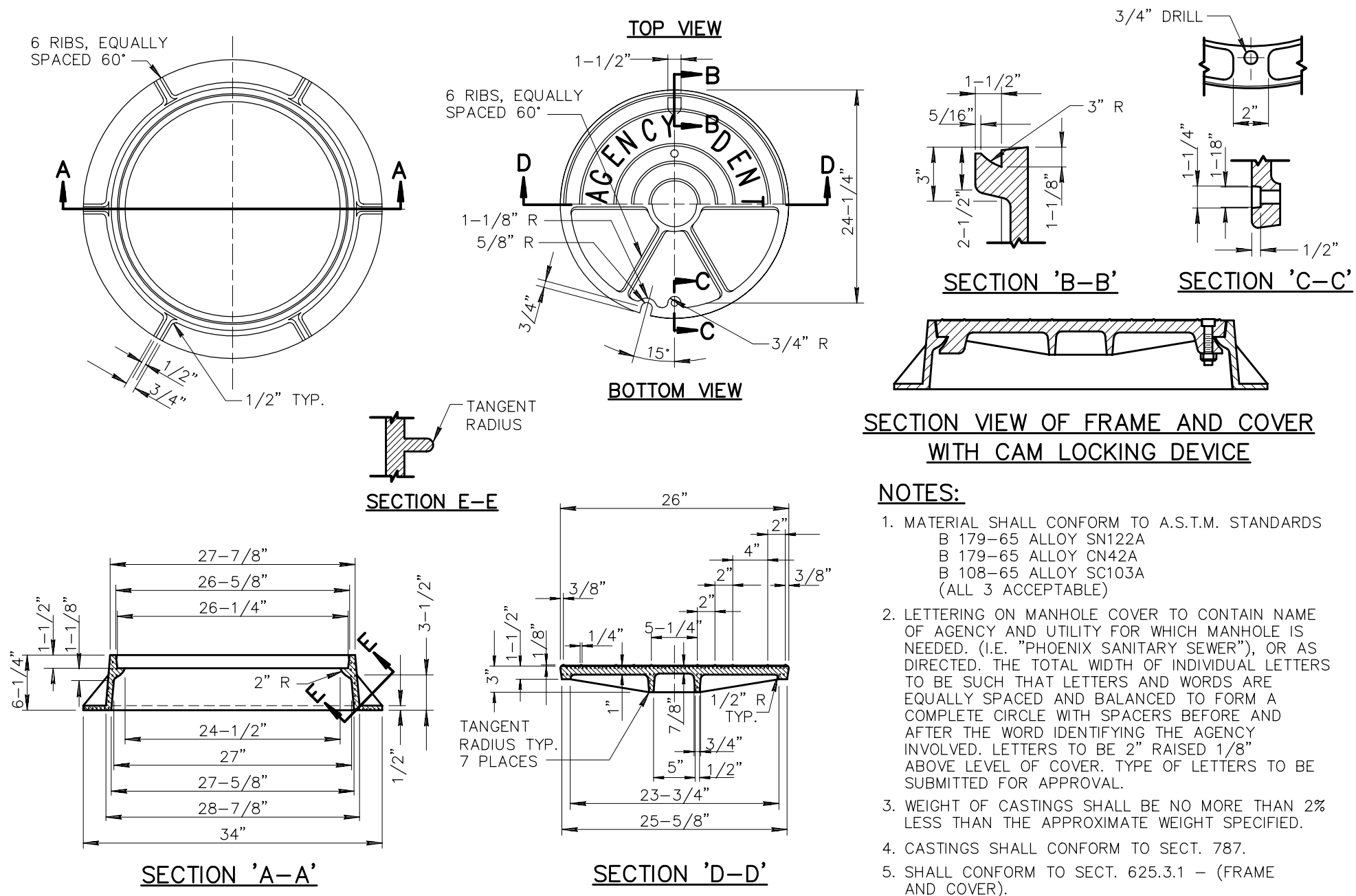
STANDARD DETAIL
ENGLISH

24" AND 30"
MANHOLE FRAME AND COVER

REVISED

DETAIL NO.

424



DETAIL NO.

425



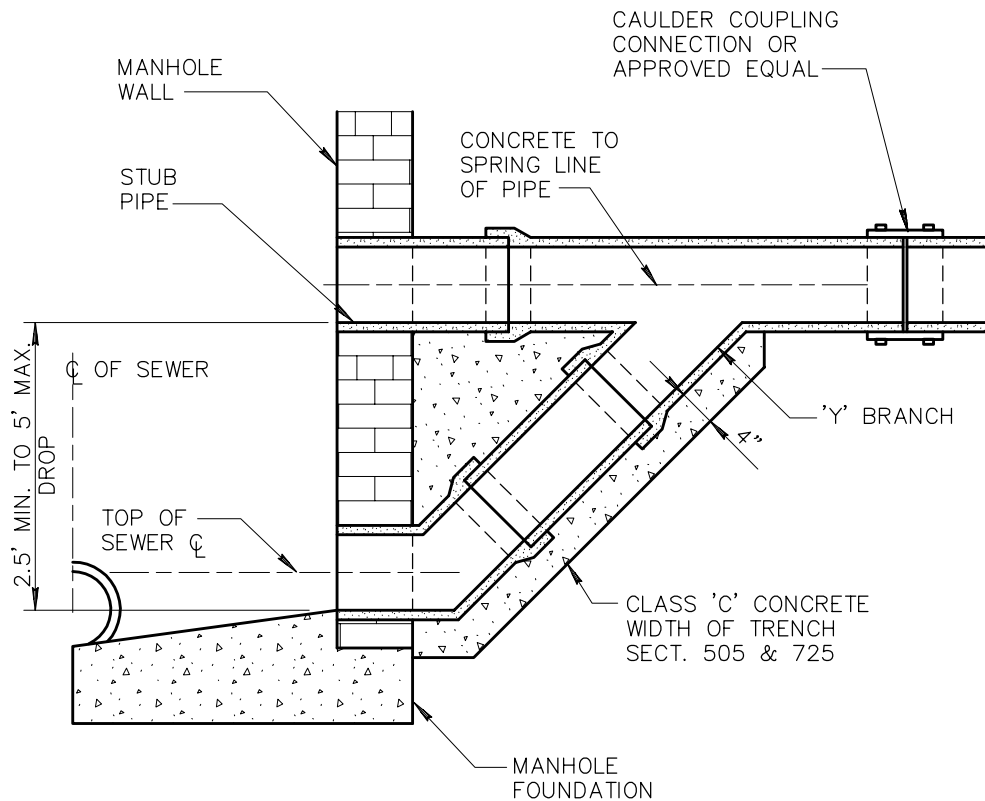
STANDARD DETAIL
ENGLISH

24" ALUMINUM MANHOLE FRAME AND COVER

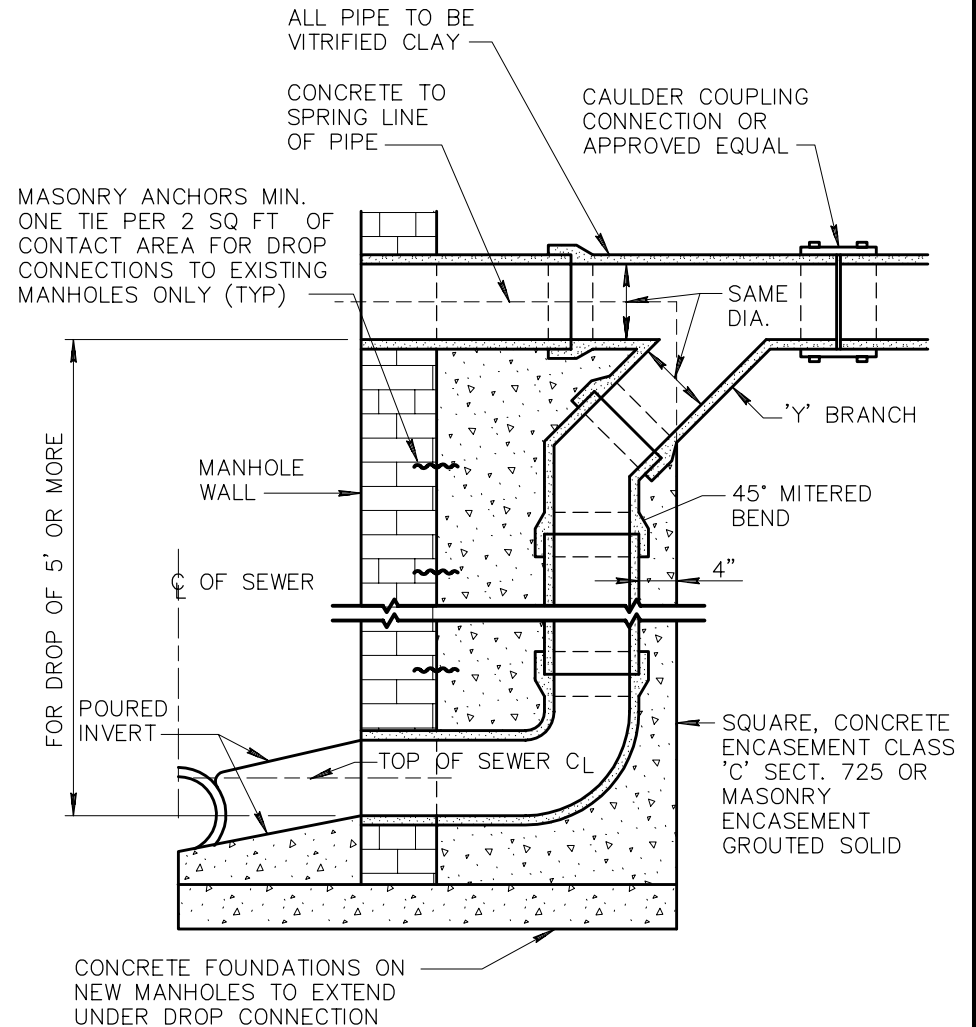
REVISED

DETAIL NO.

425



TYPE A
2.5' TO 5' DROP



TYPE B
5' OR MORE

DETAIL NO.

426



**STANDARD DETAIL
ENGLISH**

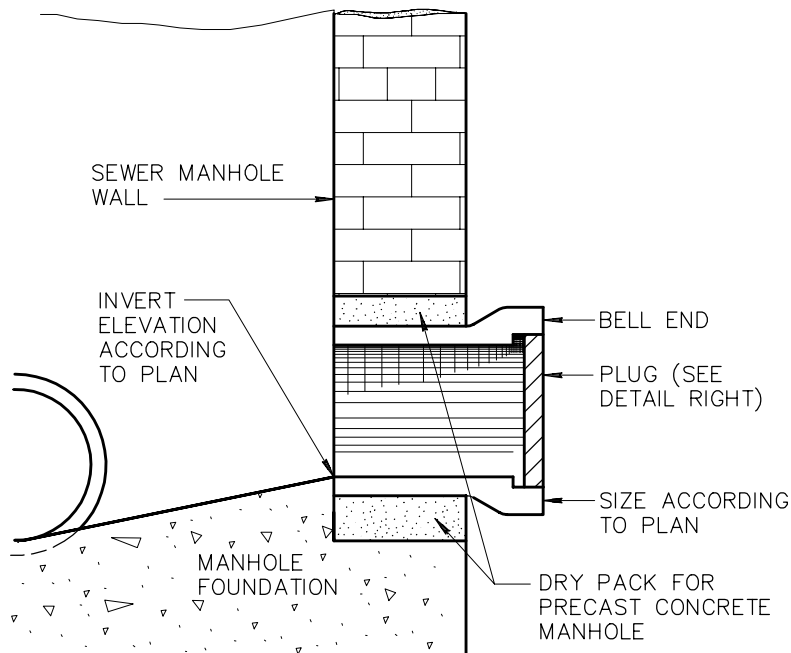
DROP SEWER CONNECTIONS

REVISED

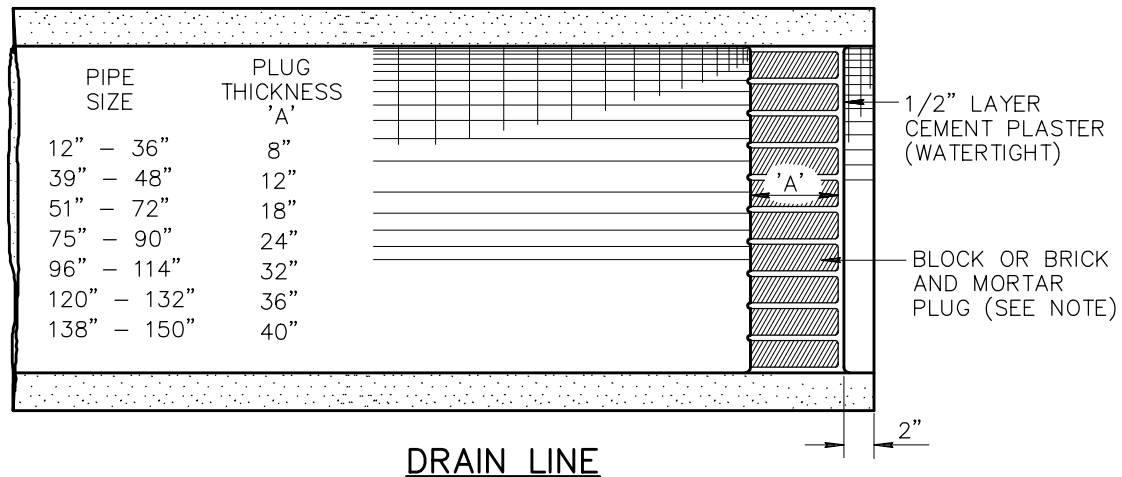
01-01-2004

DETAIL NO.

426

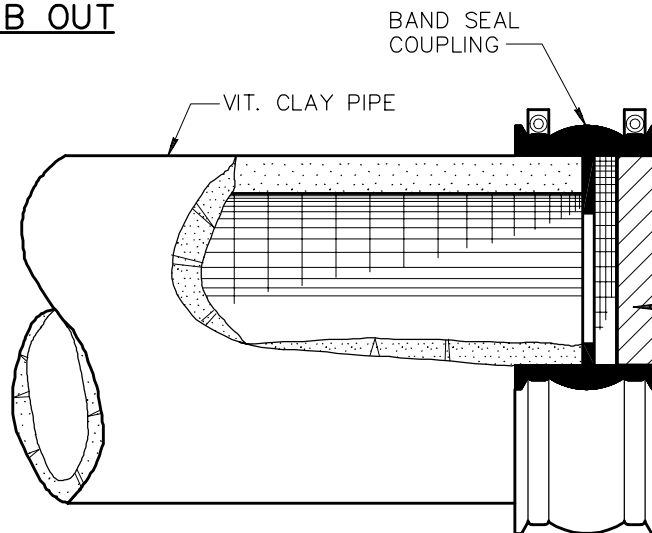


TYPICAL STUB OUT

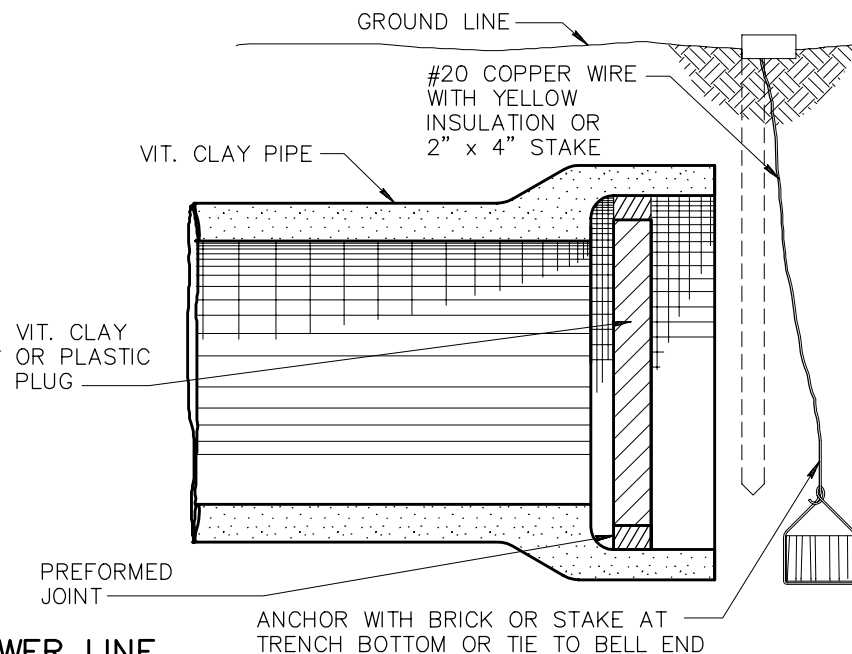


NOTES:

1. NOTE: COMPACT SOIL AT END OF PIPE TO 95% OF MAXIMUM DENSITY.
2. IF DEPTH OF COVER IS LESS THAN 5' OR GREATER THAN 10' INCREASE PLUG THICKNESS A MIN. OF 4".



SEWER LINE



DETAIL NO.

427



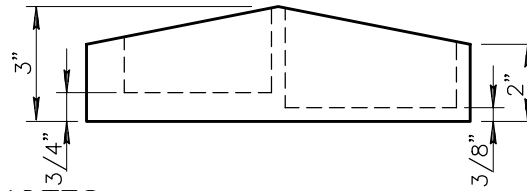
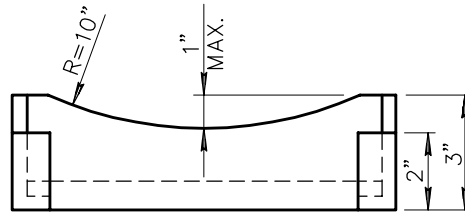
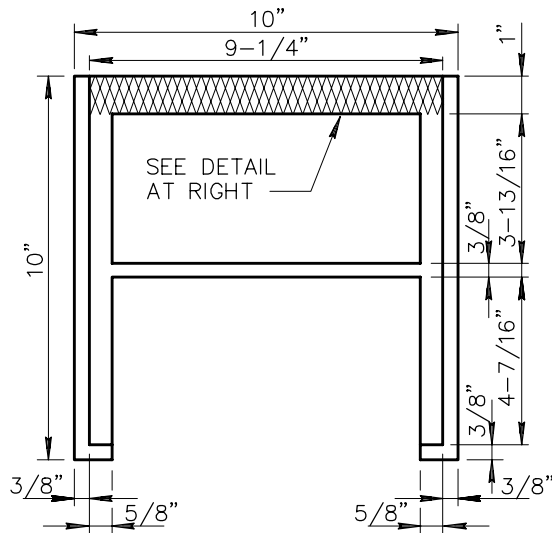
STANDARD DETAIL
ENGLISH

STUB OUT AND PLUGS

REVISED

DETAIL NO.

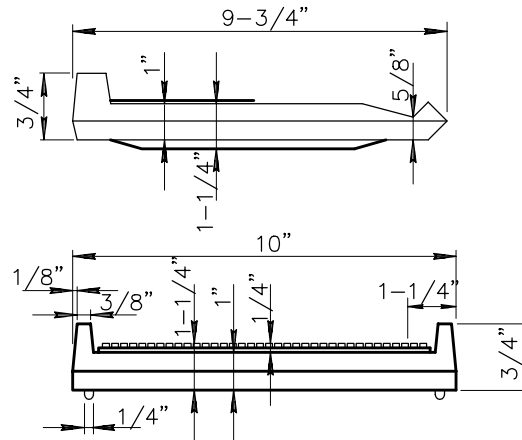
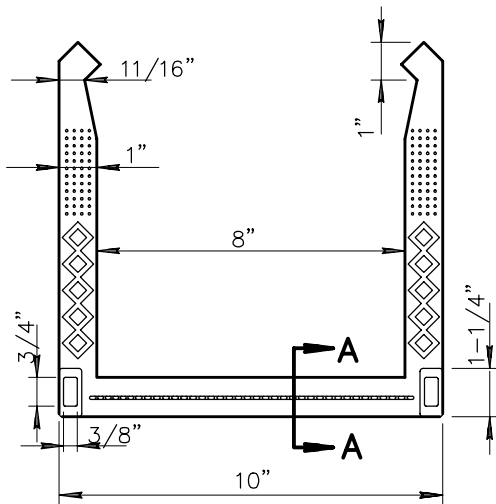
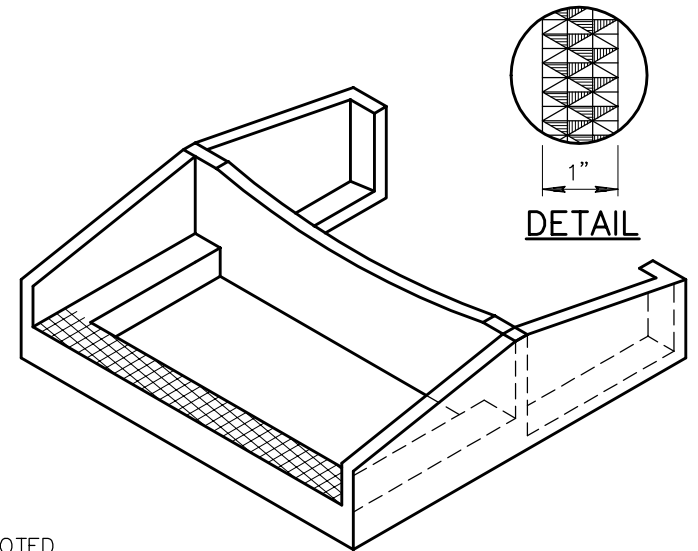
427



NOTES

1. ALL DIMENSIONS ARE MINIMUM EXCEPT WHERE NOTED.
2. CASTING AS PER SECT. 787.

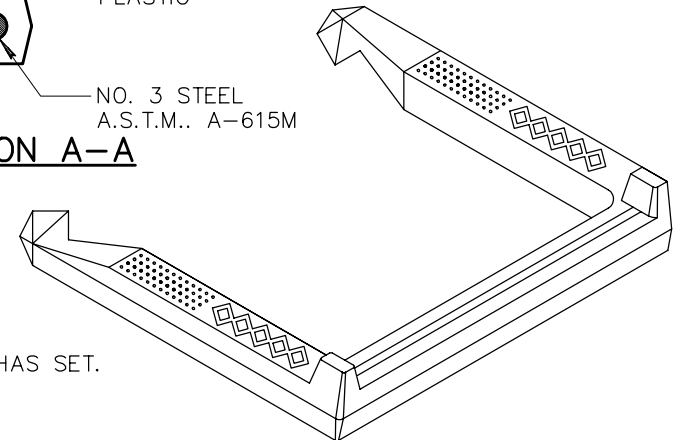
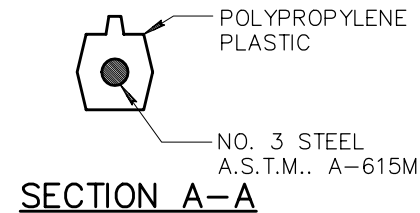
CAST IRON MANHOLE STEP



NOTES

1. STEPS SHALL BE PLACED INTO WET CONCRETE WALL DURING MANUFACTURE OR MORTARED INTO HOLES AFTER CONCRETE HAS SET.
2. POLYPROPYLENE MUST MEET REQUIREMENTS OF A.S.T.M. 2146, TYPE II, GRADE 16906.

POLYPROPYLENE MANHOLE STEP



DETAIL NO.

428



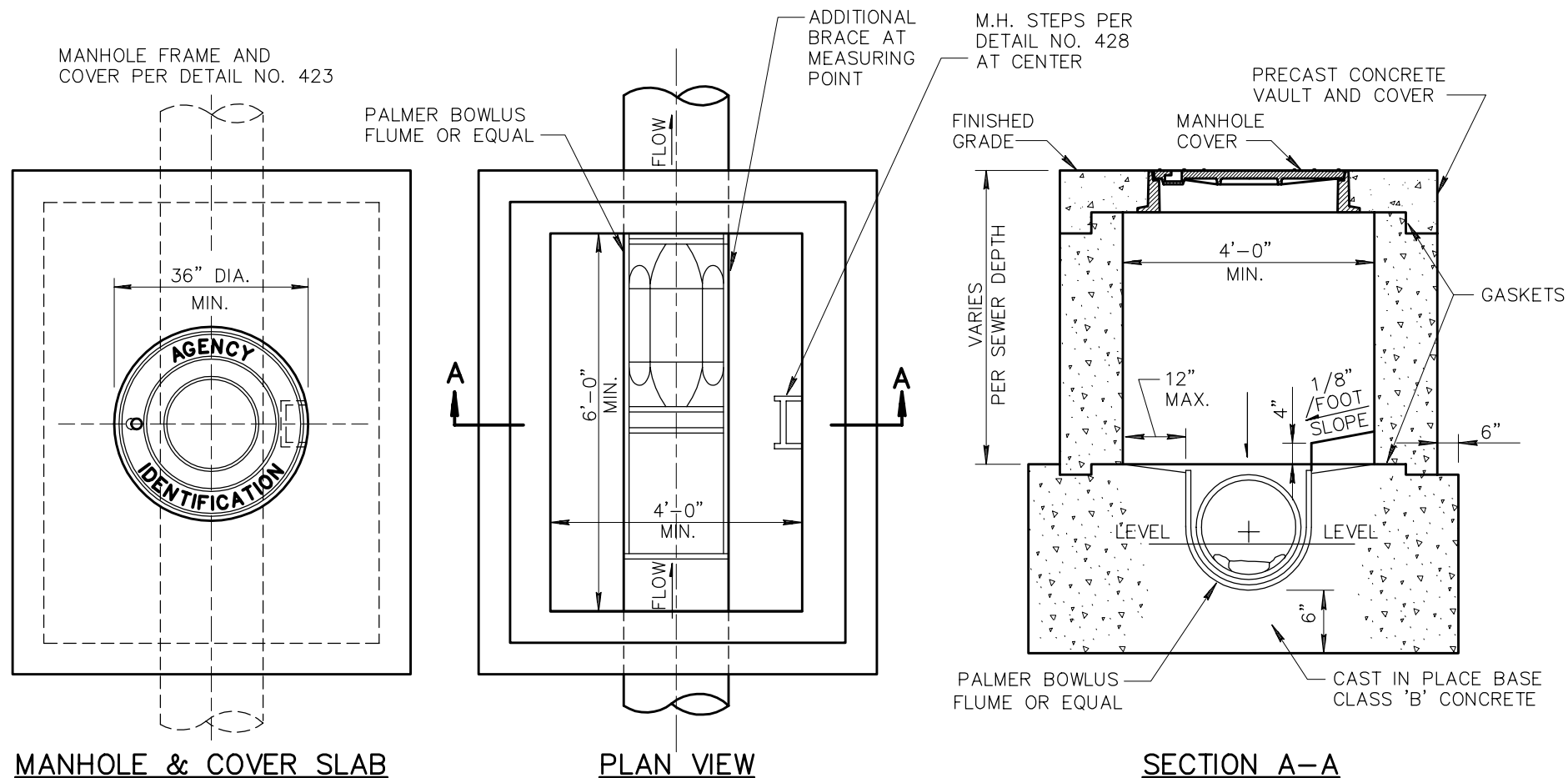
STANDARD DETAIL
ENGLISH

MANHOLE STEPS

REVISED

DETAIL NO.

428



NOTES:

1. THIS CONTROL VAULT WITH MANHOLE AND COVER SHALL BE USED ON 6" AND 8" DIAMETER SEWER WITH FLOWS IN THE RANGE OF 40 TO 340 GPM.
2. VAULT TO BE CONSTRUCTED ON STRAIGHT RUN OF BUILDING SEWER. ACCESSIBLE AND SAFELY LOCATED ON THE OWNERS PROPERTY ADJACENT TO A PUBLIC RIGHT-OF-WAY.
3. THE PALMER BOWLUS FLUME SHALL BE INSTALLED PER THE MANUFACTURERS RECOMMENDATIONS.
4. THE PRE-CAST CONCRETE VAULT SHALL BE RECTANGULAR WITH MINIMUM INSIDE DIMENSIONS OF 4' WIDE AND 6' LONG AND AT A DEPTH OF THE DESIGN OF THE BUILDING SEWER.
5. A SHOP DRAWING SHALL BE SUBMITTED TO THE CONTRACTING AGENCY FOR APPROVAL BEFORE INSTALLATION OF THE VAULT AND THE PALMER BOWLUS FLUME WILL BE ALLOWED.

DETAIL NO.

429



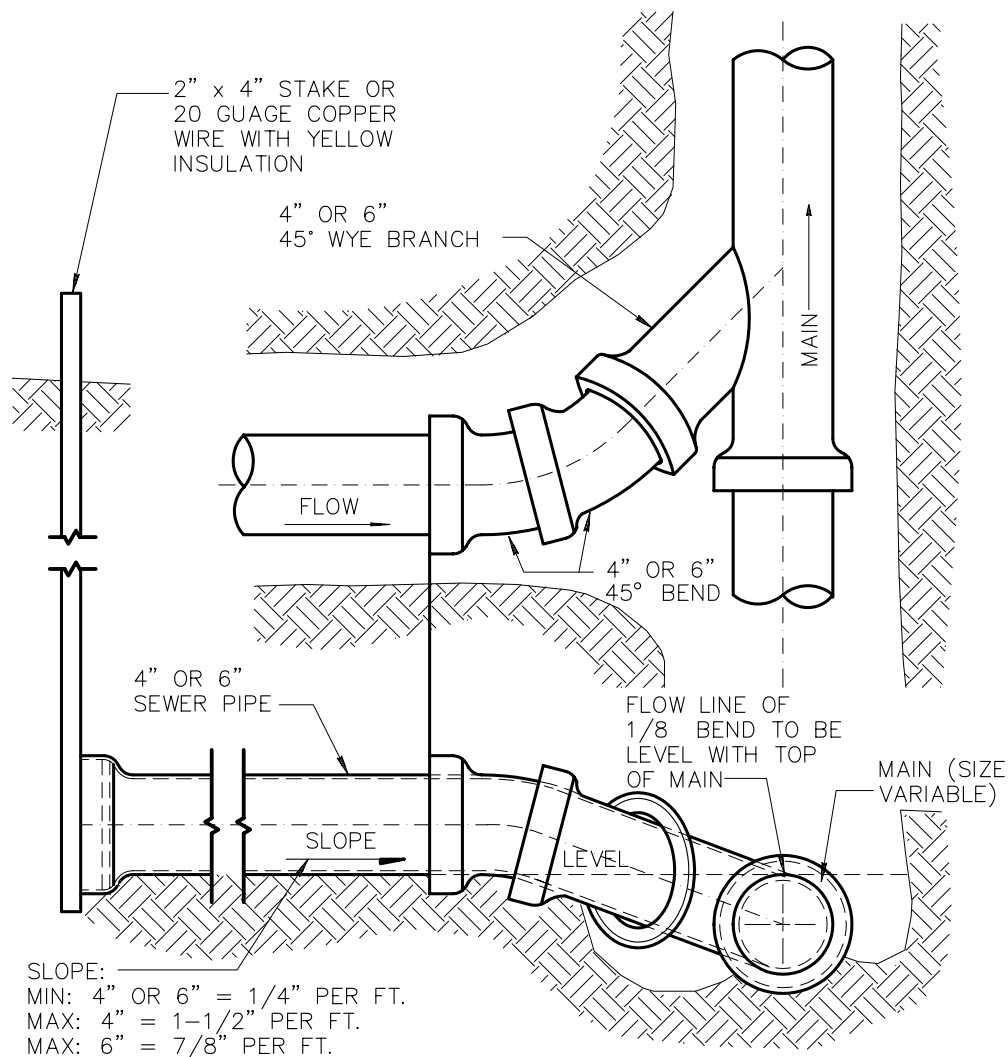
STANDARD DETAIL
ENGLISH

**INDUSTRIAL WASTE CONTROL
VAULT WITH MANHOLE**

REVISED

DETAIL NO.

429

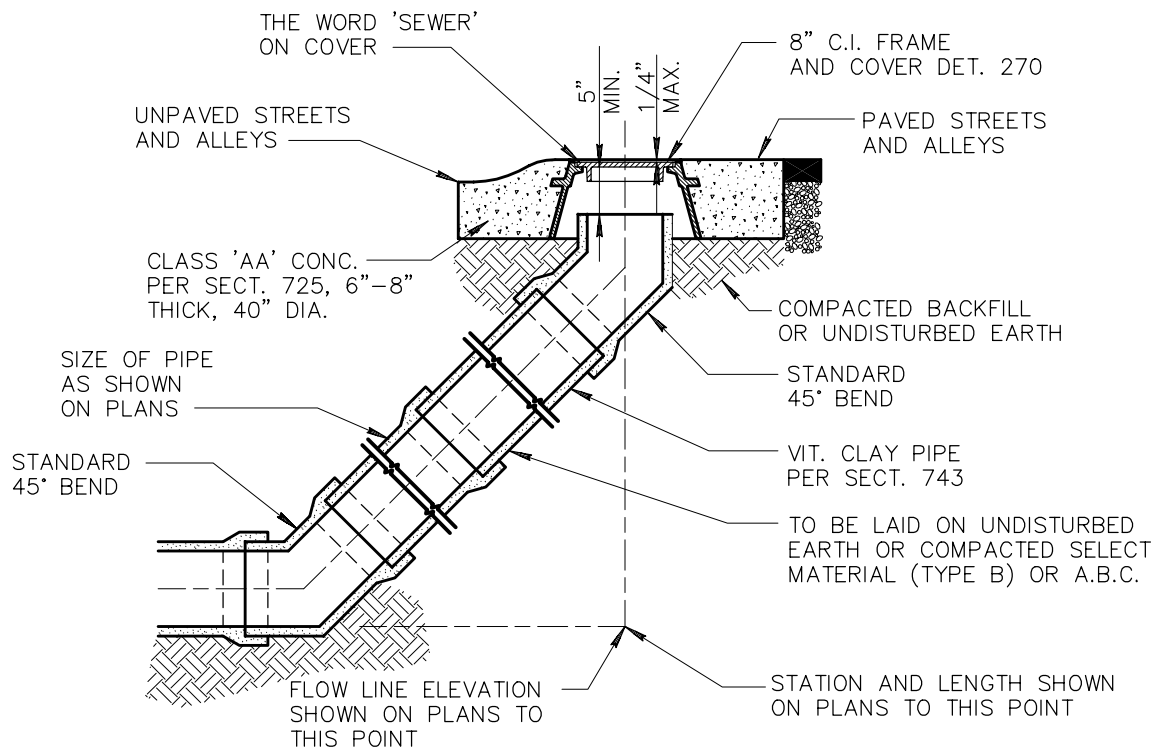


SLOPE:
 MIN: 4" OR 6" = 1/4" PER FT.
 MAX: 4" = 1-1/2" PER FT.
 MAX: 6" = 7/8" PER FT.

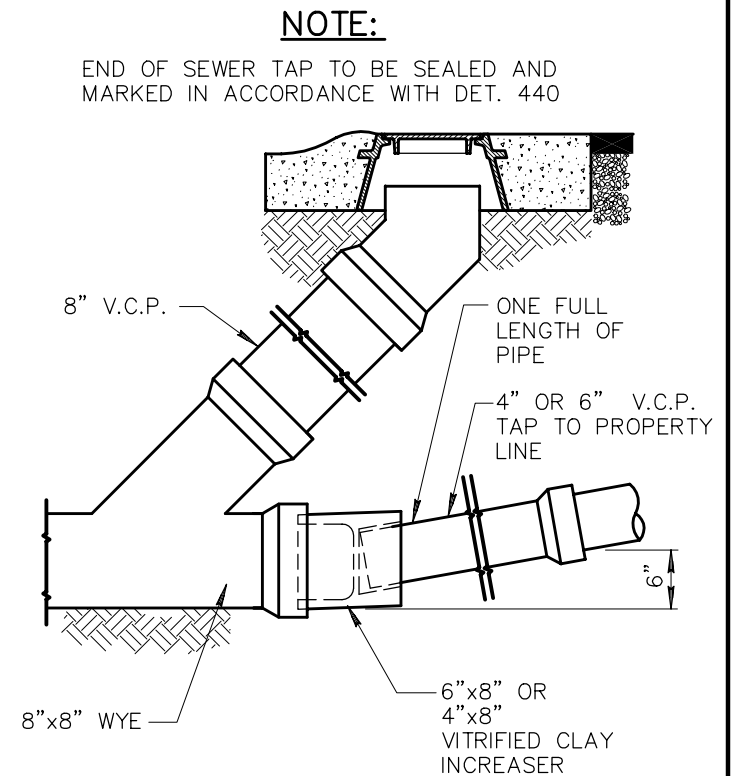
TYPE "A"

NOTES:

1. CONSTRUCTION DETAIL APPLIES WHERE CONTRACTOR BUILDS HOUSE CONNECTION. TAP EXTENDS TO PROPERTY LINE IN ALLEYS OR STREETS OR TO EASEMENT LINE.
2. SIZE OF TAP SHALL BE DESIGNATED ON PLANS.
3. CONSTRUCT TAP AT MINIMUM SLOPE IF COVER WILL BE LESS THAN 5' AT PROPERTY LINE.
4. ALL FITTINGS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D-2321. THE CONTRACTOR MAY VARY FROM THE DRAWING TO USE THE APPROPRIATE WYES, TEE-WYES AND BENDS TO ENSURE NO MISALIGNMENT OF THE PIPE AND FITTINGS. BLOCK OR BRACE FITTINGS JOINTS TO ENSURE ZERO DEGREES ANGULAR JOINT DIRECTION.
5. END OF TAP TO BE SEALED AND MARKED AS NOTED.



CLEANOUT INSTALLATION



SEWER TAP AT CLEANOUT

DETAIL NO.

441



STANDARD DETAIL
ENGLISH

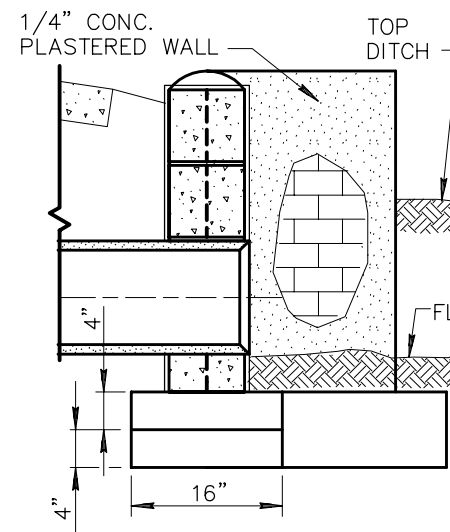
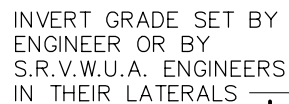
SEWER CLEANOUT

REVISED

01-01-2001

DETAIL NO.

441



CLASS "A"
CONC.
AS PER
SECT. 725

B

BLOCK

$L/2$

$L/2$

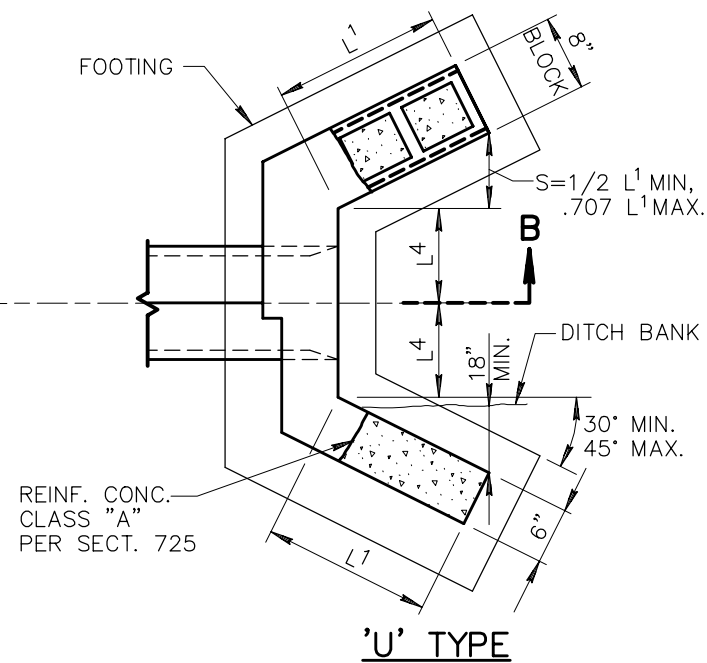
ANGLE OF HEADWALL
TO MEET O.D. OF
PIPE _____

SPRAY BANDS
WITH CURING
COMP. —→

CLASS "A" —
CONC. AS PER
SECT. 725

NO.4 REINF. BAR FULL -
LENGTH IN EACH CORE.
CORES TO BE FILLED
WITH GROUT MIX 1:3

'L' TYPE
PLAN



501-1



STANDARD DETAIL
ENGLISH

HEADWALL

REVISÉ

DETAIL NO.

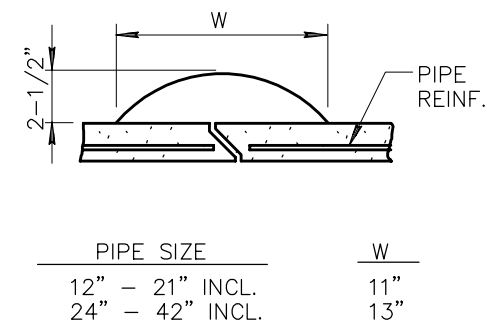
501-1



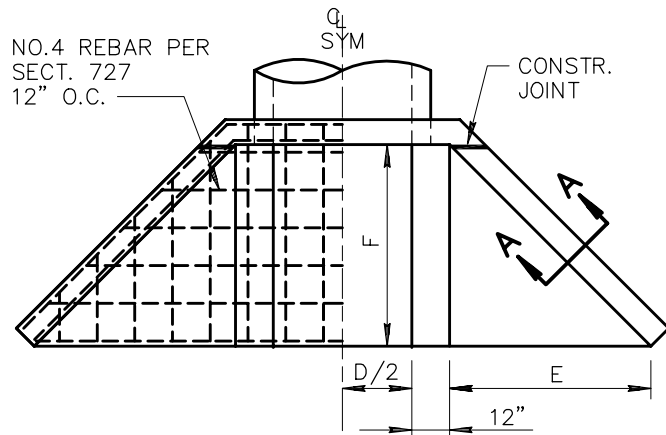
NOTES:

1. ALL CONCRETE SHALL BE CLASS 'A' PER SECT. 505 & 725.
2. CONCRETE MASONRY UNITS (BLOCK) PER SECT. 510, 775 & 776.
3. CONCRETE REINF. SHALL BE NO.4 BAR 12" O.C. BOTH WAYS.

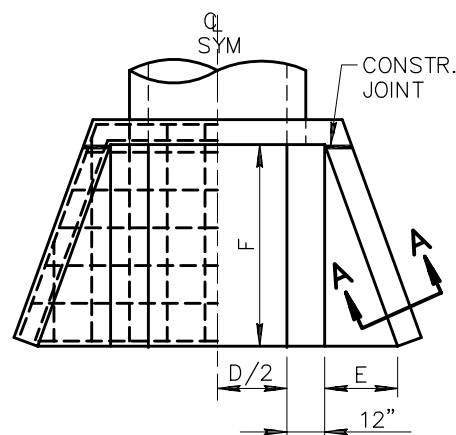
* NOMINAL PIPE SIZE GIVEN FOR REINFORCED CONC. PIPE.



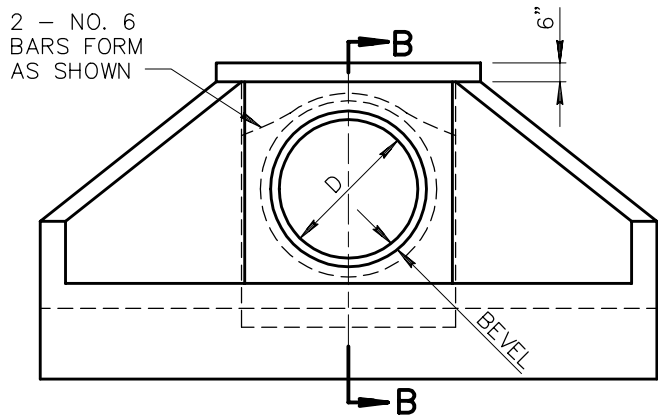
DETAIL "A"



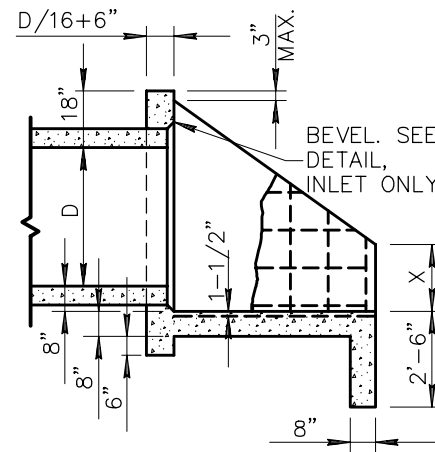
INLET HEADWALL



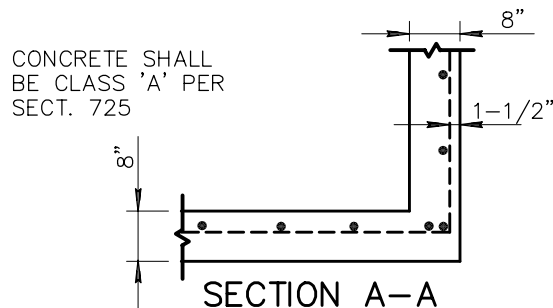
OUTLET HEADWALL



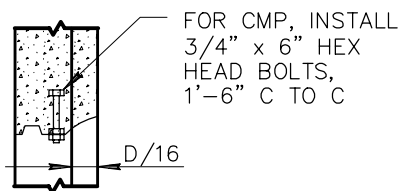
**INLET HEADWALL FACE ELEVATION
OUTLET SIMILAR**



SECTION B-B



SECTION A-A



CMP BEVEL DETAIL

1:1 1/2 EMBANKMENT SLOPE

D	TYPE *	DIMENSIONS		
		F	E	X
42"	1 (IN)	5'-2"	5'-2"	1'-9"
	2 (OUT)	5'-2"	1'-11"	1'-9"
48"	3 (IN)	5'-8"	5'-8"	1'-11"
	4 (OUT)	5'-8"	2'-1"	1'-11"
54"	5 (IN)	6'-2"	6'-2"	2'-1"
	6 (OUT)	6'-2"	2'-3"	2'-1"
60"	7 (IN)	6'-8"	6'-8"	2'-3"
	8 (OUT)	6'-8"	2'-5"	2'-3"
66"	9 (IN)	7'-2"	7'-2"	2'-5"
	10 (OUT)	7'-2"	2'-7"	2'-5"
72"	11 (IN)	7'-8"	7'-8"	2'-7"
	12 (OUT)	7'-8"	2'-9"	2'-7"
78"	13 (IN)	8'-2"	8'-2"	2'-9"
	14 (OUT)	8'-2"	3'-0"	2'-9"
84"	15 (IN)	8'-8"	8'-8"	2'-11"
	16 (OUT)	8'-8"	3'-2"	2'-11"

1:4 EMBANKMENT SLOPE

D	TYPE *	DIMENSIONS		
		F	E	X
42"	17 (IN)	8'-8"	8'-8"	3'-0"
	18 (OUT)	8'-8"	3'-2"	3'-0"
48"	19 (IN)	8'-8"	8'-8"	3'-6"
	20 (OUT)	8'-8"	3'-2"	3'-6"
54"	21 (IN)	8'-8"	8'-8"	4'-0"
	22 (OUT)	8'-8"	3'-2"	4'-0"
60"	23 (IN)	9'-4"	9'-4"	4'-4"
	24 (OUT)	9'-4"	3'-5"	4'-4"
66"	25 (IN)	9'-8"	9'-8"	4'-9"
	26 (OUT)	9'-8"	3'-6"	4'-9"
72"	27 (IN)	9'-8"	9'-8"	5'-3"
	28 (OUT)	9'-8"	3'-6"	5'-3"
78"	29 (IN)	10'-0"	10'-0"	5'-8"
	30 (OUT)	10'-0"	3'-8"	5'-8"
84"	31 (IN)	10'-8"	10'-8"	6'-0"
	32 (OUT)	10'-8"	3'-11"	6'-0"

* (IN) REFERS TO INLET
(OUT) REFERS TO OUTLET

DETAIL NO.

501-3



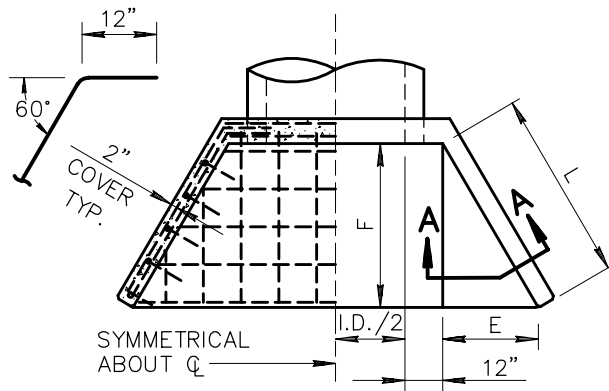
STANDARD DETAIL
ENGLISH

HEADWALL 42" TO 84" PIPE

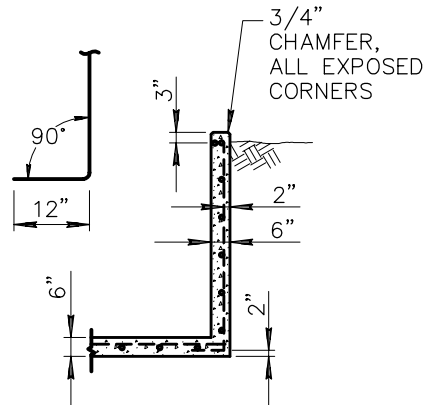
REVISED

DETAIL NO.

501-3

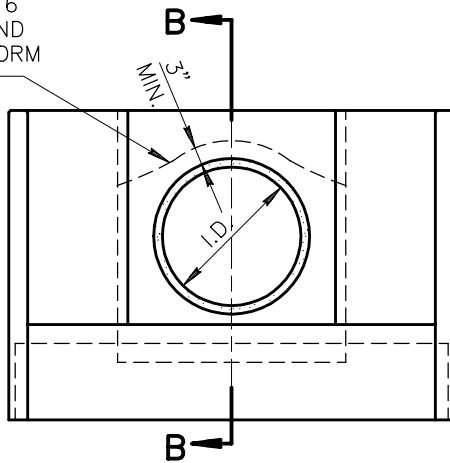


PLAN

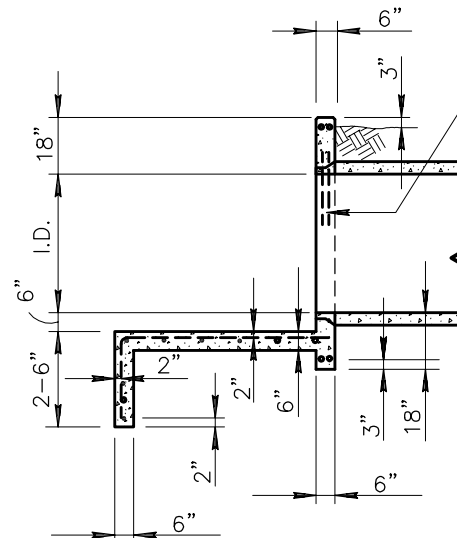


SECTION A-A

2 - NO. 6
BARS BEND
TO CONFORM
TO PIPE



ELEVATION



SECTION B-B

2 - NO. 6 BARS
BEND TO CONFORM
TO PIPE

PIPE I.D.	DIMENSIONS		
	L	E	F (APPROX)
18"	2'-0"	1'-0"	1'-9"
24"	2'-0"	1'-0"	1'-9"
30"	3'-0"	1'-6"	2'-7"
36"	4'-0"	2'-0"	3'-6"
42"	5'-0"	2'-6"	4'-4"
48"	6'-0"	3'-0"	5'-2"
54"	7'-0"	3'-6"	6'-1"
60"	8'-0"	4'-0"	6'-11"

NOTES:

1. ALL CONCRETE SHALL BE CLASS 'A' PER SECT. 725.
2. ALL REINFORCING BARS SHALL BE NO. 4 EXCEPT NO. 6 BARS OVER PIPE. BAR SPACING APPROXIMATELY 12" C TO C UNLESS OTHERWISE NOTED.
3. 30° WING WALL FLARE SHOWN; 45° NORMALLY DESIRABLE.

DETAIL NO.

501-4



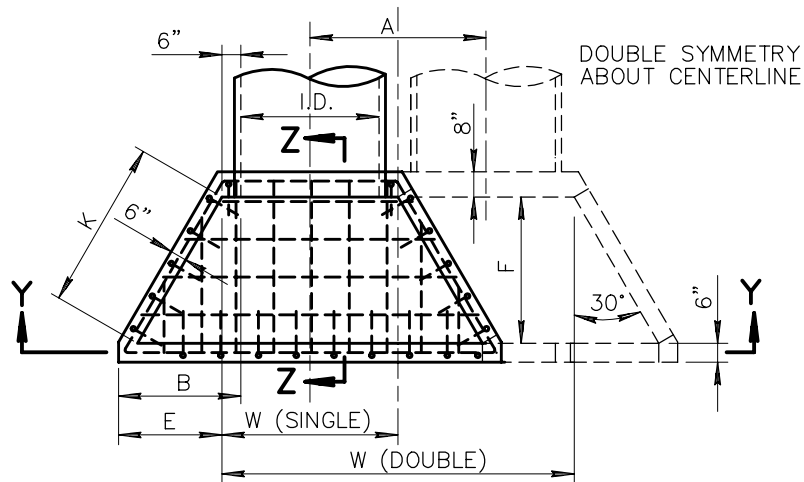
STANDARD DETAIL
ENGLISH

**HEADWALL IRRIGATION
18" TO 60" PIPE**

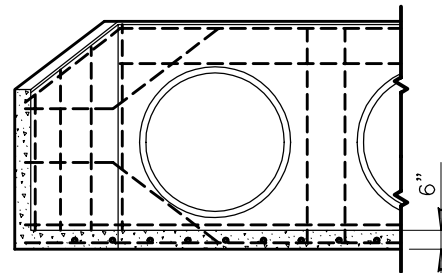
REVISED

DETAIL NO.

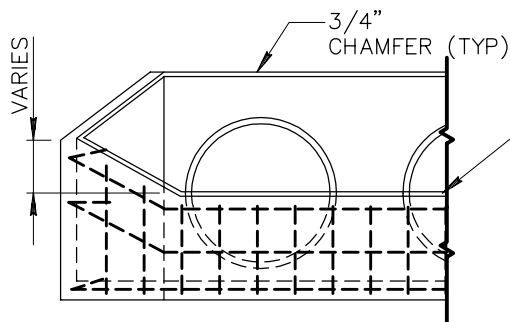
501-4



PLAN

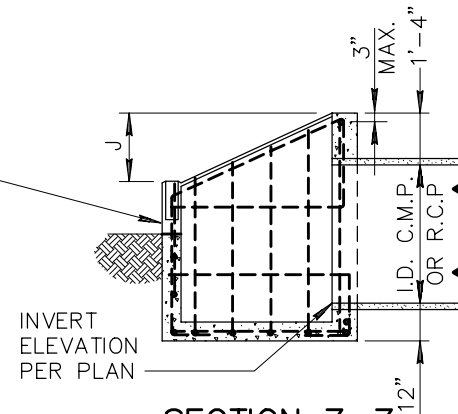


SECTION Y-Y



ELEVATION

ELEVATION
PER PLAN



SECTION Z-Z

PIPE	DIMENSIONS							
	W		A	B	E	F	J	K
	SINGLE	DOUBLE						
18"	2'-6"	5'-2"	2'-8"	1'-3"	0'-9"	1'-3 5/8"	9"	1'-6"
24"	3'-0"	6'-6"	3'-6"	1'-7 1/2"	1'-1 1/2"	1'-11 3/8"	11"	2'-3"
30"	3'-6"	7'-10"	4'-4"	2'-0"	1'-6"	2'-7 1/4"	1'-1"	3'-0"
36"	4'-0"	9'-2"	5'-2"	2'-4 1/2"	1'-10 1/2"	3'-3"	1'-4"	3'-9"
42"	4'-6"	10'-6"	6'-0"	2'-9"	2'-3"	3'-10 3/4"	1'-6"	4'-6"

NOTES:

1. HIGH POINT OF HEADWALL SHALL NOT PROJECT MORE THAN 3" ABOVE SLOPE.
2. ALL CONCRETE SHALL BE CLASS 'A' PER SECT. 725.
3. ALL REINFORCING BARS SHALL BE NO. 4, 12" C TO C AND 3" CLEAR TO INSIDE OF FLOOR AND WALLS.

DETAIL NO.

501-5



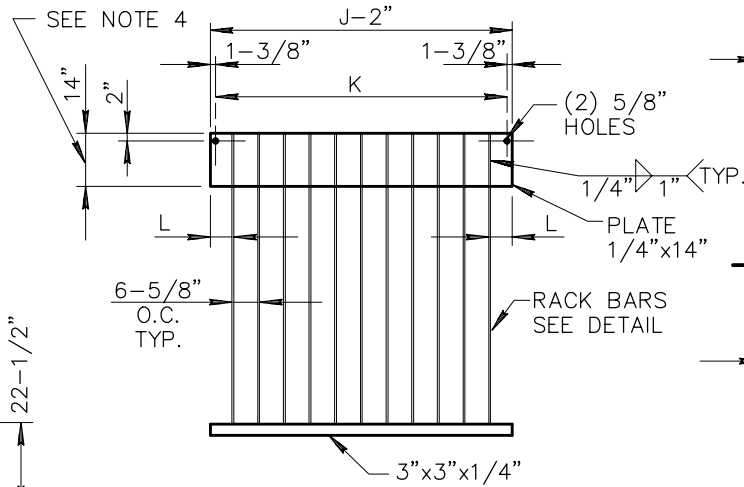
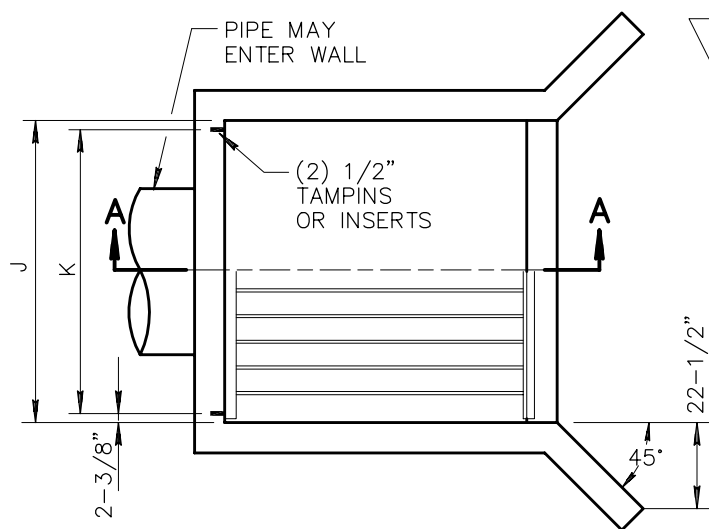
STANDARD DETAIL
ENGLISH

HEADWALL DROP INLET

REVISED

DETAIL NO.

501-5



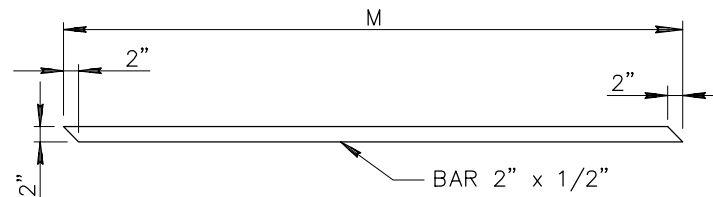
TRASH RACK

POURED WALLS

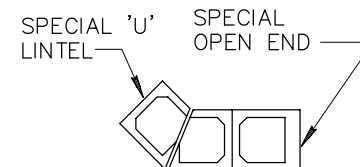
NO. 4 REINFORCED BARS 12\"/>

BLOCK WALLS

BLOCK HEADWALL TO HAVE ONE NO.4 REINF. BAR CENTERED IN EACH CORE FOR FULL HEIGHT AND CORES FILLED WITH CONCRETE OR CEMENT GROUT (3:1 RATIO). ALL BLOCKS TO BE JOINED WITH MORTAR. PLASTERED ON EXPOSED SURFACES THEN SPRAY WITH WHITE PIGMENTED CURING COMPOUND. SECT. 510, 727 & 776.



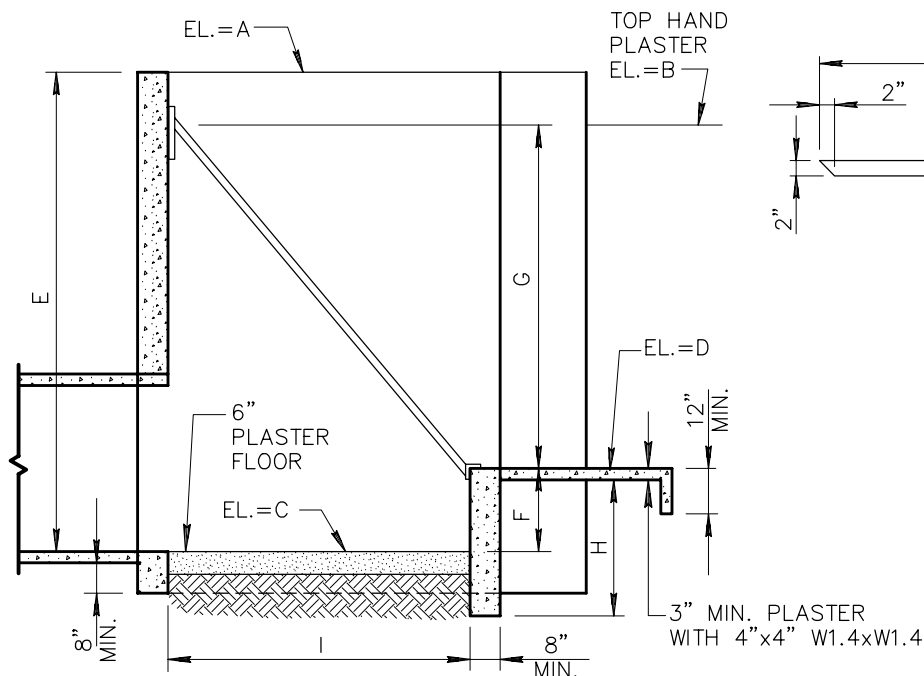
RACK BARS



45° BLOCK CORNER

NOTES:

1. REMOVE ALL SCALE FROM RACK BARS. METAL SPRAY OR PAINT WITH ONE COAT ZINC CHROMATE OR RED LEAD PRIMER (INDUSTRIAL QUALITY). OVERCOAT WITH GREY INDUSTRIAL ENAMEL SECT. 790.
2. SHAPE, COMPACT AND PLASTER NEW DITCH FROM HEADWALL TO UNDISTURBED EXISTING DITCH. PLASTER TO EXTEND TO MINIMUM ELEVATION NOTED 3 FEET BEYOND CONNECTION TO UNDISTURBED EXISTING DITCH.
3. ELEVATIONS A, B, C & D AND DIMENSIONS E, F, G, H, I, J, K, L & M WILL BE SHOWN ON PLANS. DIMENSIONS SHOULD PROVIDE STANDARD SIZE BLOCK.
4. 14\"/>



SECTION A-A

DETAIL NO.

502-1



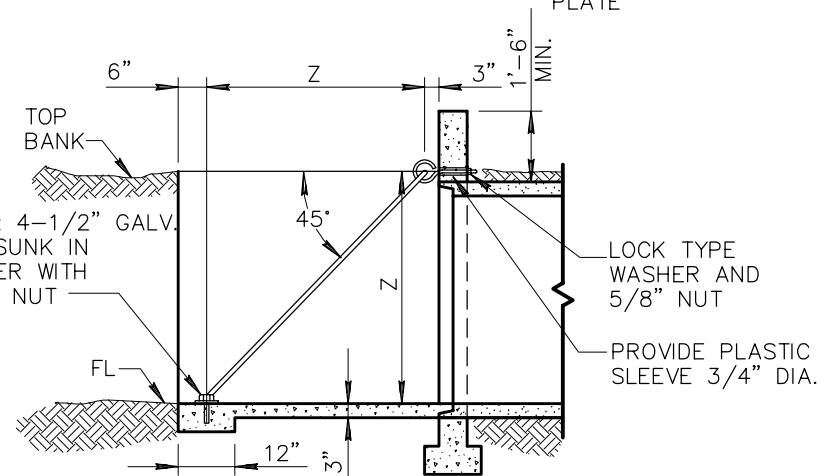
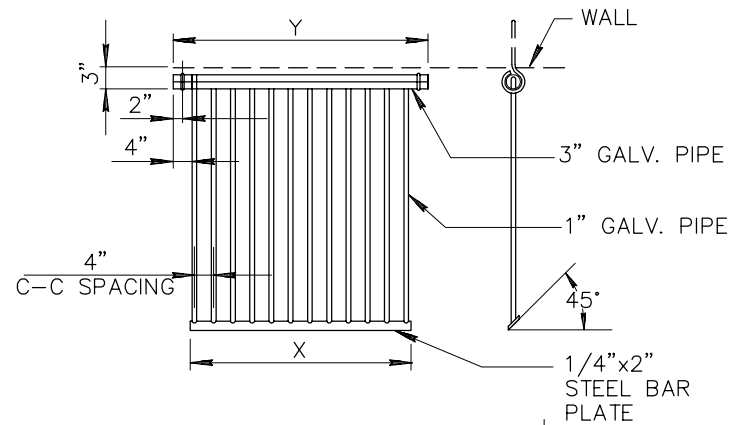
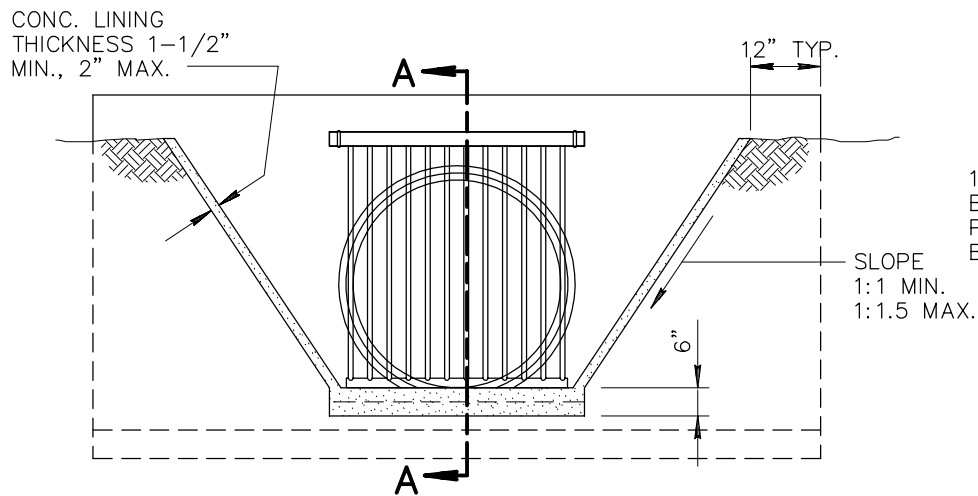
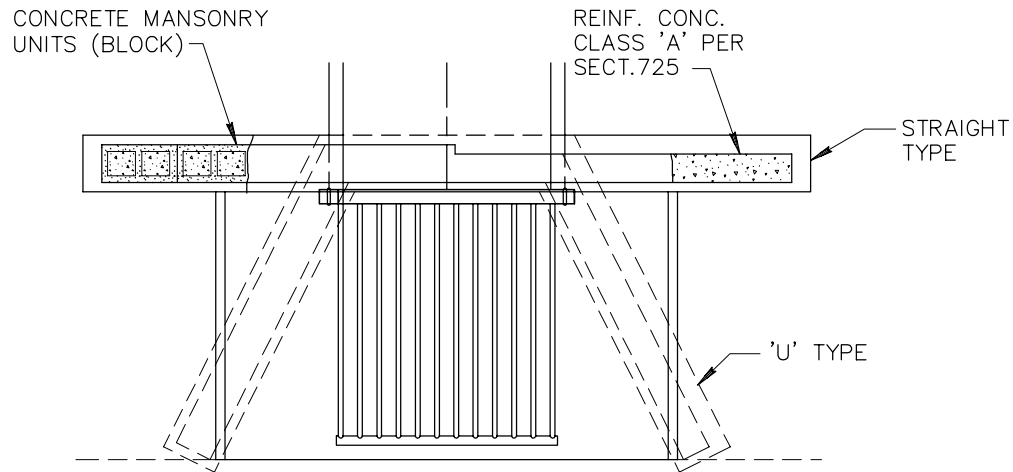
STANDARD DETAIL
ENGLISH

TRASH RACK

REVISED

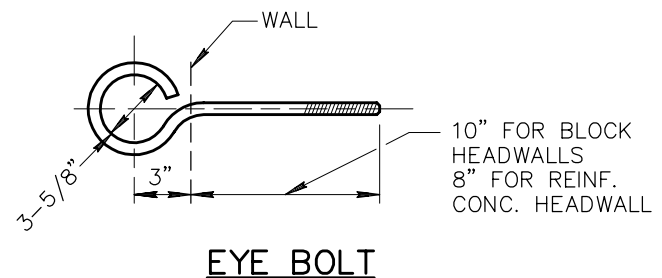
DETAIL NO.

502-1



SECTION A-A

TYPE BASED ON PIPE SIZE						
TYPE	PIPE SIZE	NO. OF BARS	LENGTH OF BARS	DIMENSIONS		
				X	Y	Z
A	18"	6	3'-7"	1'-9"	2'-5"	2'-5"
	24"	8	3'-7"	2'-5"	3'-1"	2'-5"
B	30"	10	4'-4 1/4"	3'-1"	3'-9"	2'-11 1/2"
C	36"	10	5'-1 1/2"	3'-1"	3'-9"	3'-6"
D	42"	12	5'-10 5/8"	3'-9"	4'-5"	4'-0 1/2"
E	48"	14	6'-7 3/4"	4'-5"	5'-1"	4'-7"



DETAIL NO.

502-2



STANDARD DETAIL
ENGLISH

TRASH RACK

REVISED

01-01-2004

DETAIL NO.

502-2

NOTE:
PAINT COVER BOTH SIDES
ONE PRIME COAT, TWO
FINISH COATS, SECT.
790, PAINT NO. 9

10 GAUGE SHEET
STEEL COVER

HANDLE EXTENDS
6" BELOW
TOP WHEN GATE
IS OPEN

STANDARD
CONCRETE
PIPE

CONCRETE AS
REQUIRED TO
SECURE GATE

FINISH
GRADE

VARIABLE

(2) 5/16"
HOLES
4" O.C.

1/4" ROD
HANDLE

2-1/2"

GROUT
JOINTS
WATER
TIGHT

GATE TYPE,
SIZE AND NO.
REQUIRED AS
GIVEN ON PLANS

SIZE OF PIPE
AS SHOWN
ON PLANS

30"
UNLESS OTHERWISE
SPECIFIED

TYPE 'A'

NOTES:

1. BRACE TO BE INSTALLED EVERY 2'
FROM TOP OF HEADGATE FRAME. BOTTOM
BRACE TO BE HIGH ENOUGH TO ENABLE
FULL OPENING OF HEADGATE.
2. INSTALL 1/2" BOLTS INTO LEAD
PLUG DRILLED TO WITHIN 1" OF
OUT SIDE OF STANDPIPE. SPACERS
TO BE INSTALLED AT EACH BOLT
BETWEEN HEADGATE FRAME AND INSIDE
OF STAND PIPE.
3. LOCATION OF 2" HOLE FOR GATE
STEM TO BE DETERMINED AFTER
INSTALLATION OF GATE.
4. CONCRETE SHALL BE
CLASS A PER SECT. 725.

PAINT ARROW ON OUTSIDE OF
STANDPIPE INDICATING DIRECTION
"TO OPEN" HEADGATE.

SEE NOTE 2

SEE NOTE 1

GROUT JOINTS
WATER TIGHT

18"
MIN.

SIZE OF
PIPE AS
SHOWN
ON PLANS

FORM CONC. AROUND
END OF PIPE BEHIND
HEADGATE FRAME

SEE NOTE 3

(4) 3/8" BOLTS TO BE
GROUTED INTO STANDPIPE
EQUI-DISTANT WITH
1-1/2"x3" RECTANGULAR
WASHERS AND NUTS

GALVANIZED EXPANDED
METAL LID (9 GAUGE)

REINF. CONC.
PIPE

VARIES
48" MIN.
52" MAX.

FINISH
GRADE

1" C.R.S.
LIFT ROD

HEADGATE TO
BE SWANSON
800 SERIES
OR APPROVED
EQUAL

4"
4"

TYPE 'B'

DETAIL NO.

503



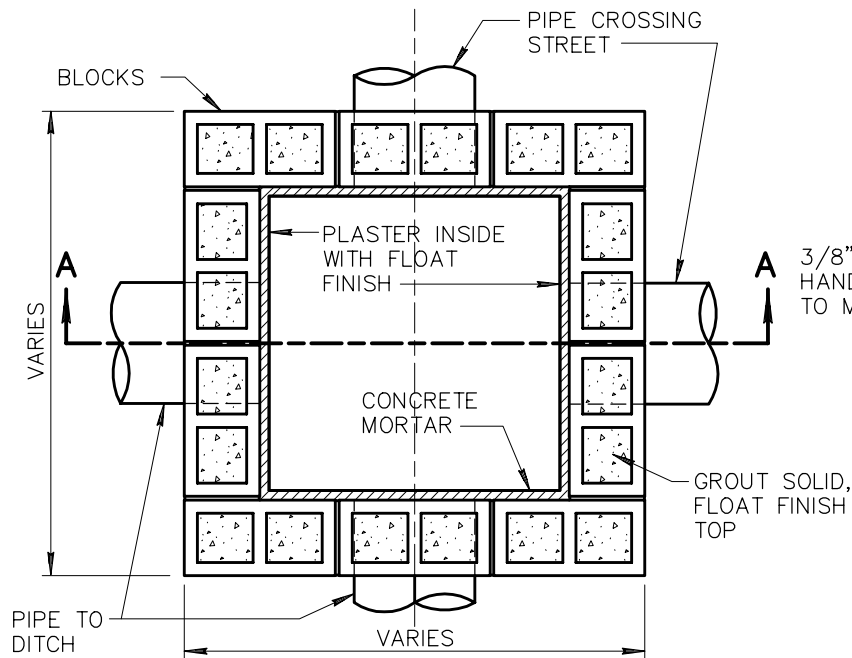
STANDARD DETAIL
ENGLISH

IRRIGATION STANDPIPE

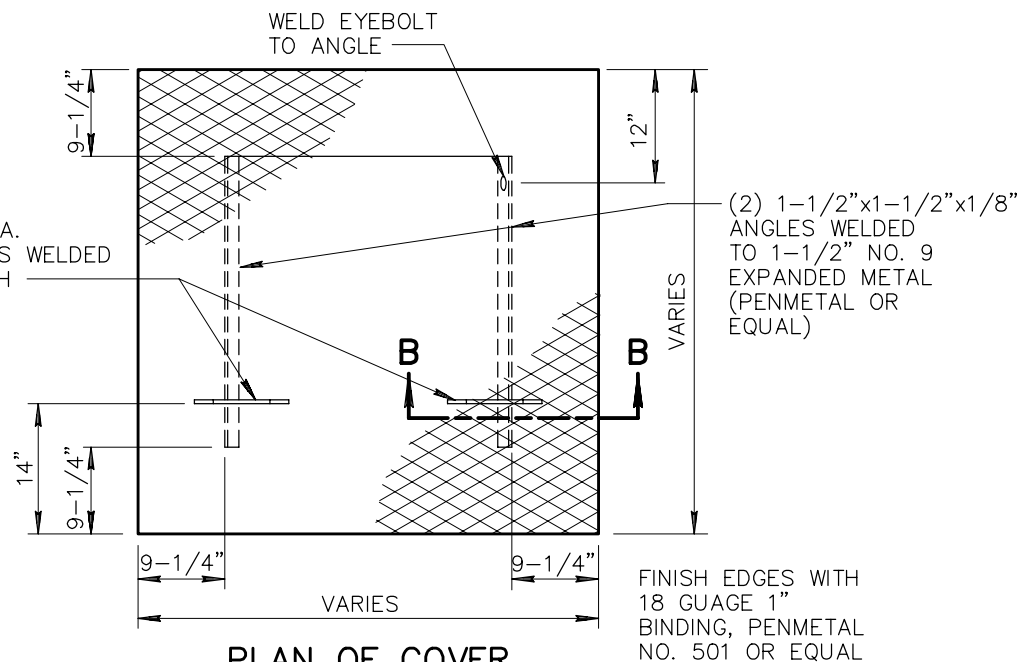
REVISED

DETAIL NO.

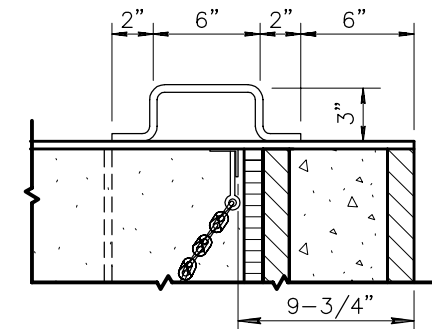
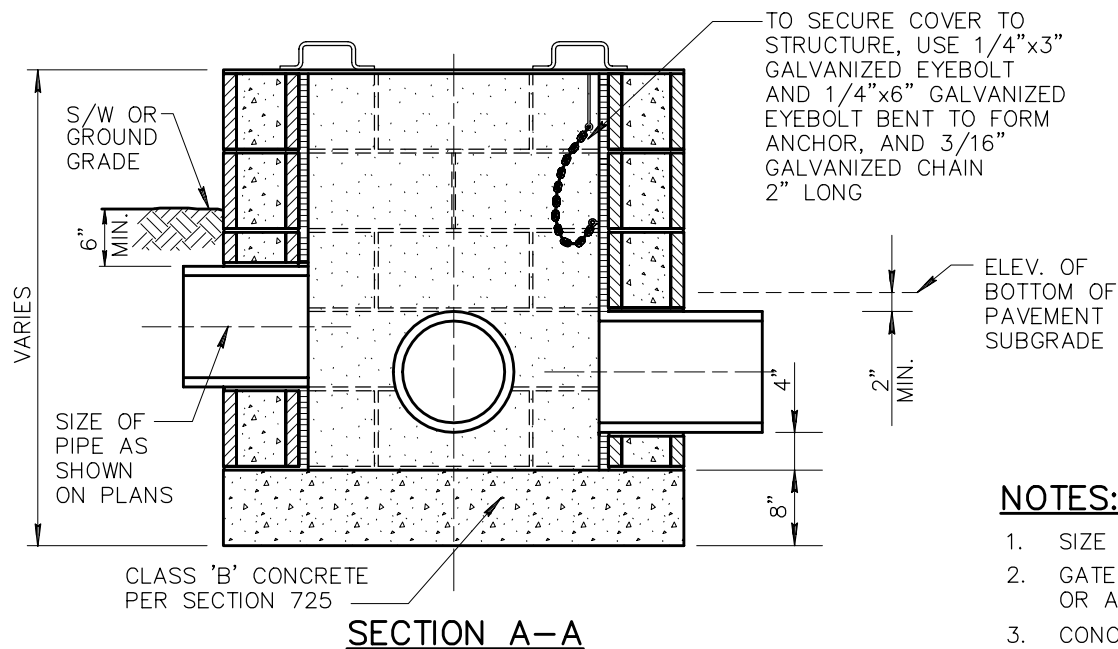
503



3/8" DIA.
HANDLES WELDED
TO MESH



PLAN OF COVER



SECTION B-B

NOTES:

1. SIZE OF JUNCTION BOX TO BE DETERMINED BY THE ENGINEER.
2. GATE TYPE, SIZE AND NUMBER REQUIRED AS SHOWN ON PLANS OR AS SPECIFIED.
3. CONCRETE MASONRY UNITS (BLOCK) PER SECT. 510, 775 & 776

DETAIL NO.

504



STANDARD DETAIL
ENGLISH

CONCRETE BLOCK JUNCTION BOX

REVISED

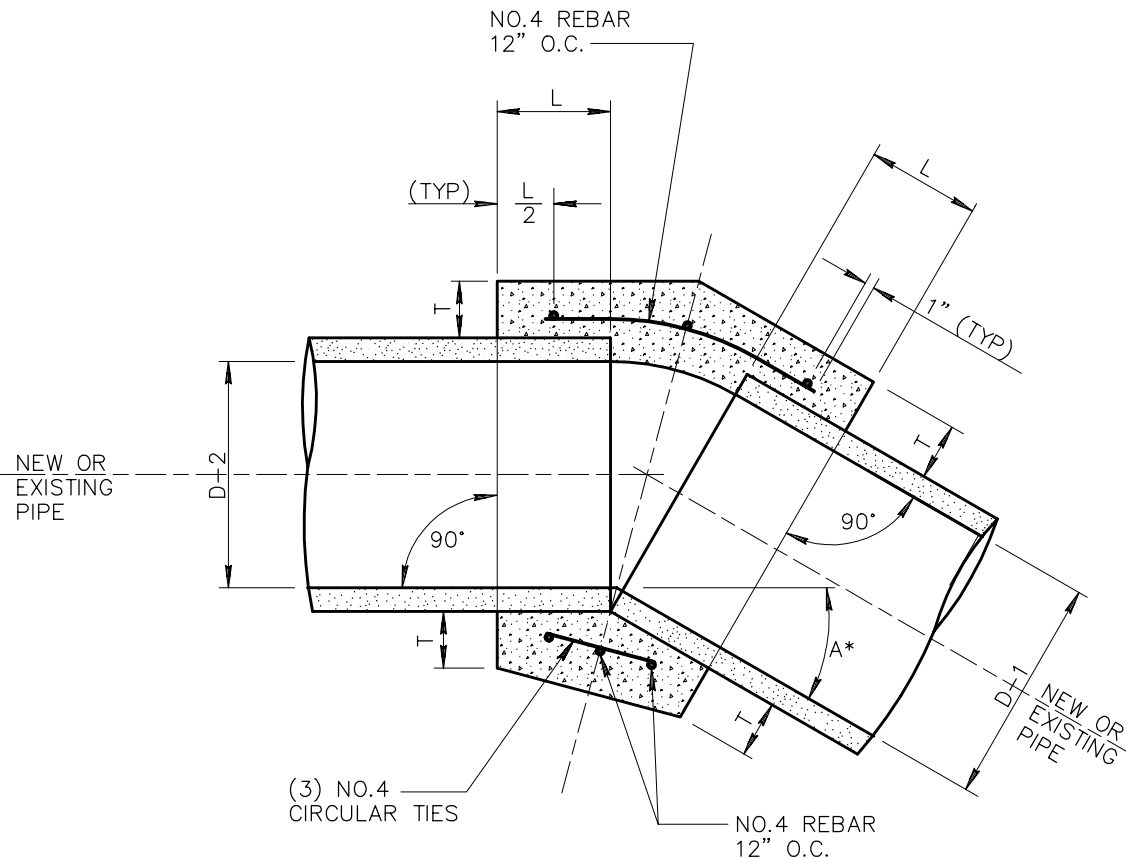
DETAIL NO.

504

NOTES:

1. A CONCRETE COLLAR IS REQUIRED WHERE PIPES OF DIFFERENT DIAMETERS OR MATERIALS ARE JOINED, OR WHERE THE CHANGE IN ALIGNMENT OR GRADE EXCEEDS THAT ALLOWED FOR ON ORDINARY JOINTS.
2. WHERE PIPES OF DIFFERENT DIAMETERS ARE JOINED WITH A CONCRETE COLLAR, L AND T SHOULD BE THOSE OF THE LARGER PIPE. $D=D-1$, OR $D-2$ WHICHEVER IS GREATER.
3. FOR PIPE SIZES NOT LISTED AND LESS THAN 66" USE NEXT SIZE LARGER.
4. OMIT REINFORCING ON PIPE 24" OR LESS IN DIAMETER.
5. WHERE REINFORCING IS REQUIRED, THE DIAMETER OF THE CIRCULAR TIES SHALL BE....
OUTSIDE DIAMETER OF PIPE+T.
6. FIELD CLOSURES OF PIPE OF THE SAME DIAMETER AND WITHOUT CHANGE IN GRADE OR ALIGNMENT SHALL BE MADE WITH A CONCRETE COLLAR.
7. CONCRETE SHALL BE CLASS B PER SECT. 725.

A*=ANGLE OF DEFLECTION



TABLE

D	L	T
12"	1.0'	4"
18"	1.0'	5"
24"	1.0'	6"
36"	1.5'	8"
48"	1.5'	10"
57"	1.5'	10"
60"	1.75'	11"
66"	1.75'	11"

DETAIL NO.

505



STANDARD DETAIL
ENGLISH

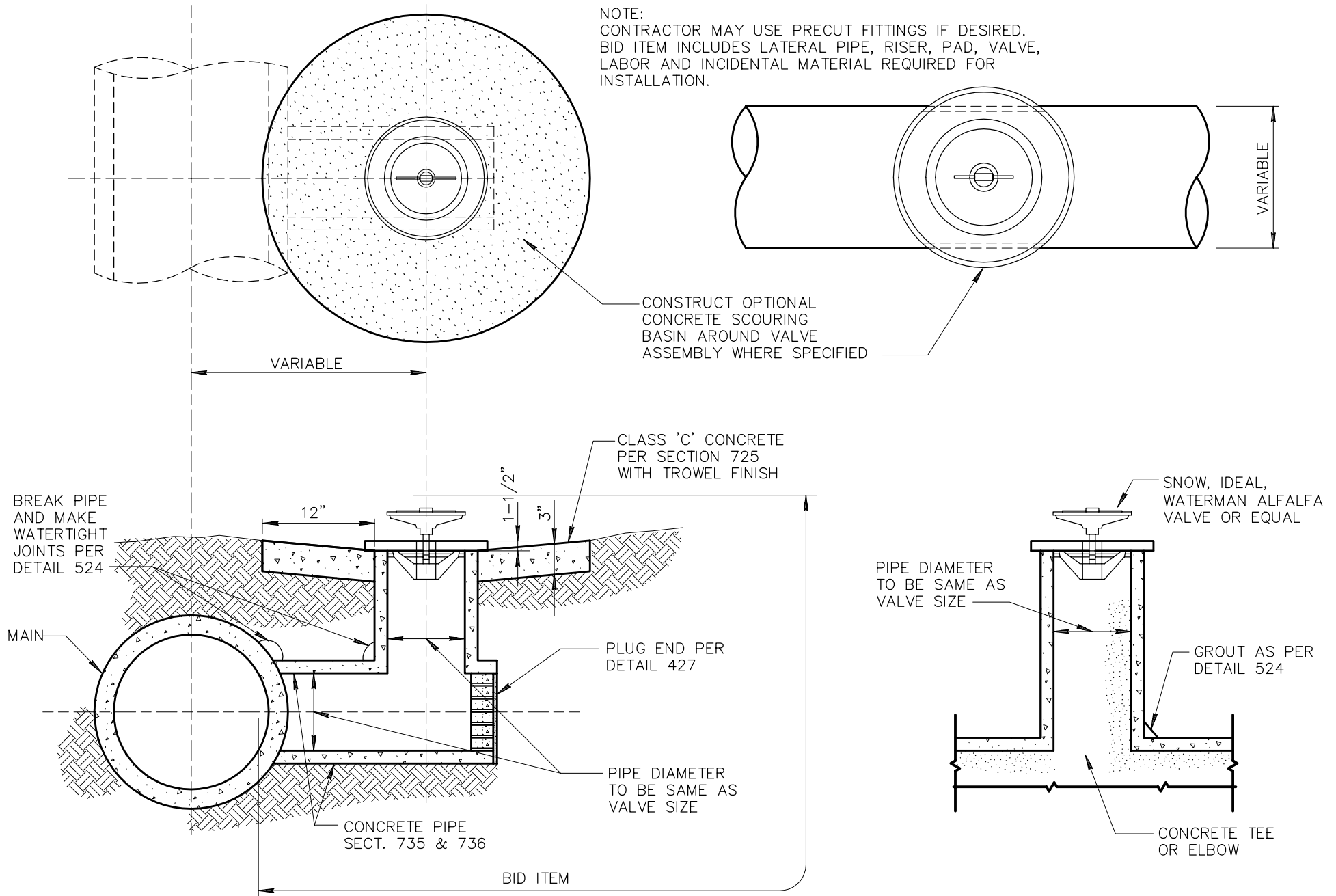
CONCRETE PIPE COLLAR

REVISED

DETAIL NO.

505

NOTE:
CONTRACTOR MAY USE PRECUT FITTINGS IF DESIRED.
BID ITEM INCLUDES LATERAL PIPE, RISER, PAD, VALVE,
LABOR AND INCIDENTAL MATERIAL REQUIRED FOR
INSTALLATION.



DETAIL NO.

506



STANDARD DETAIL
ENGLISH

IRRIGATION VALVE INSTALLATION

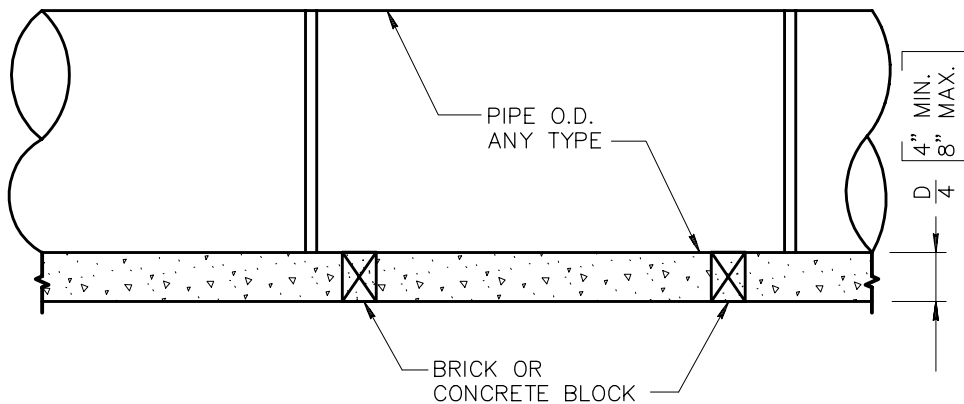
REVISED

DETAIL NO.

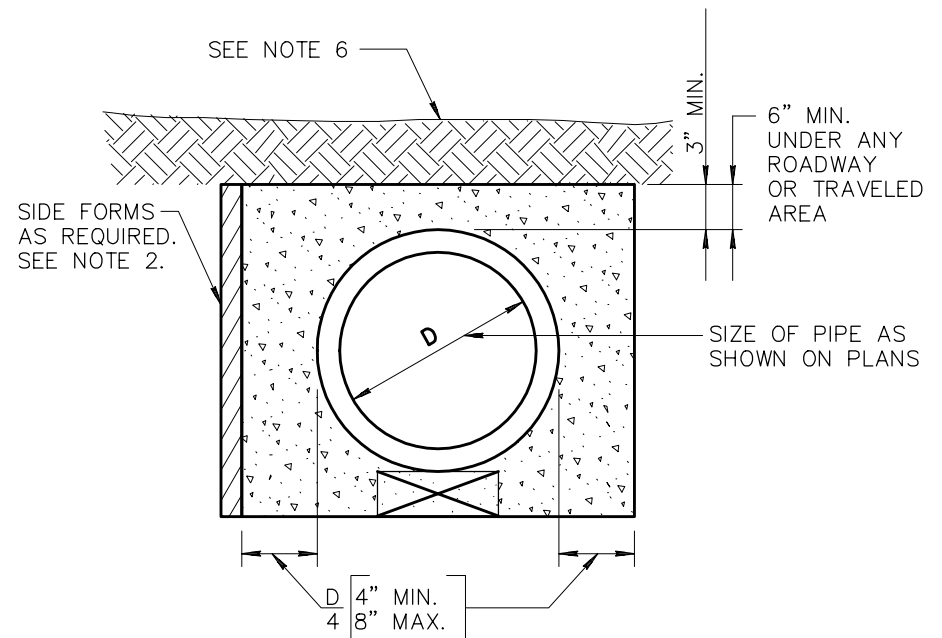
506

NOTES:

1. THIS DETAIL SHALL BE REQUIRED WHEN NEW OR EXISTING PIPE INSTALLATIONS WILL BE SUBJECT TO DAMAGE ANYTIME IN THE FUTURE DUE TO LACK OF PROPER COVER, AS DETERMINED BY THE ENGINEER.
2. FOR PIPE OVER 18" I.D. WOOD, METAL OR GYPSUM BOARD FORMS MUST BE USED TO FORM THE SIDES OF THE ENCASEMENT. GYPSUM BOARD FORMS MAY BE LEFT IN THE GROUND BELOW THE TOP OF THE ENCASEMENT. THIS SHALL BE OPTIONAL WITH POURING AGAINST TRENCH WALLS FOR ENCASEMENT OF 18" AND SMALLER PIPE.
3. FOR ALL SITUATIONS WHERE SIDE FORMS ARE USED, TRENCH WALLS SHALL BE OVER-EXCAVATED TO ALLOW SUFFICIENT ROOM TO OPERATE PROPER MECHANICAL COMPACTION EQUIPMENT.
4. CONCRETE WHICH SPILLS BEYOND 12" FROM THE SIDES OF THE PIPE FOR ANY REASON SHALL BE REMOVED BACK TO THE PROPER LINE PRIOR TO BACKFILLING.
5. SEE SECTION 601 FOR TRENCH PREPARATION.
6. CONCRETE TO BE CLASS 'A' PER SECT. 725.
7. COVER TO BE APPROVED BY ENGINEER.



LONGITUDINAL SECTION



END SECTION

DETAIL NO.

507



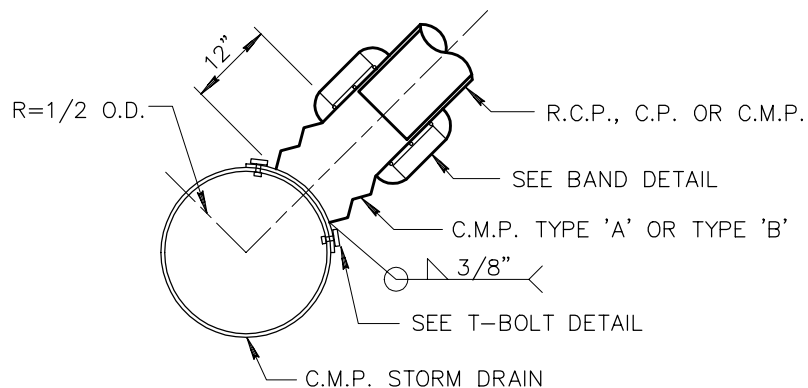
STANDARD DETAIL
ENGLISH

**ENCASED CONCRETE PIPE
(FOR SHALLOW INSTALLATION)**

REVISED

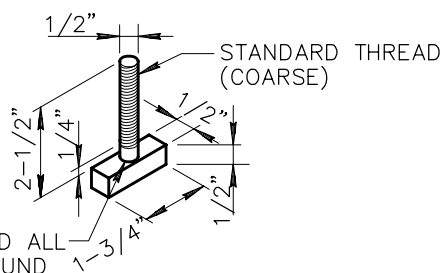
DETAIL NO.

507

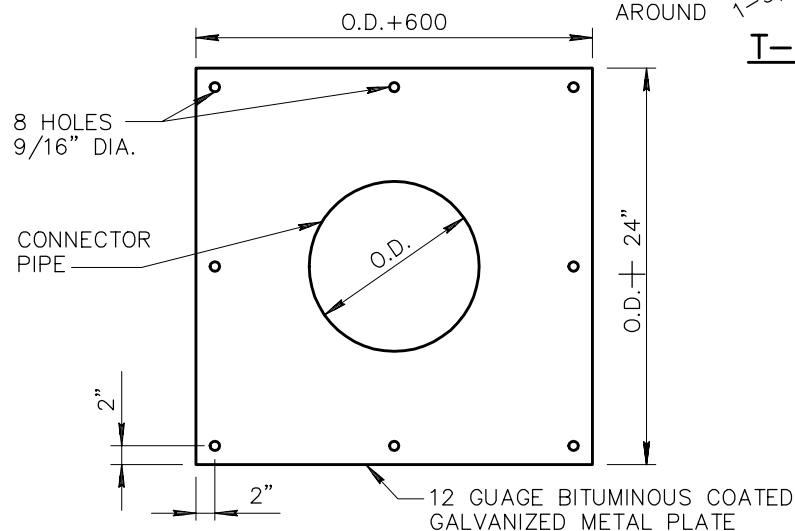


CONNECTOR CROSS SECTION

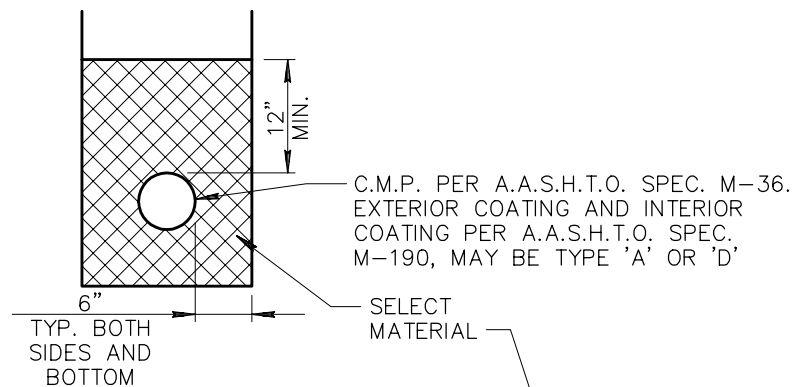
NOTE:
USE 5/8" WASHER AND NUT, ALL PIECES
(NUTS, WASHERS, AND FABRICATED BOLTS)
TO BE GALVANIZED AS PER A.S.T.M. A-123
LATEST REVISION.



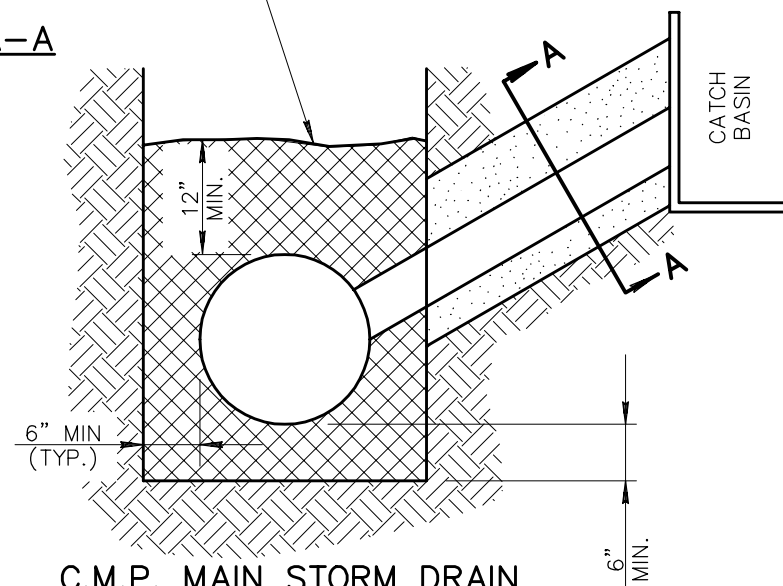
T-BOLT



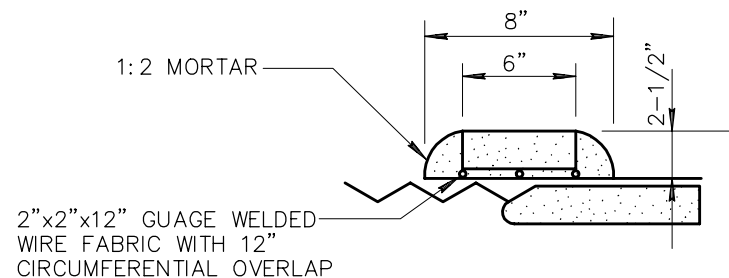
C.M.P. CONNECTION TO MAIN STORM DRAIN 24" PIPE AND SMALLER



SECTION A-A



C.M.P. MAIN STORM DRAIN



BAND DETAIL

DETAIL NO.

510



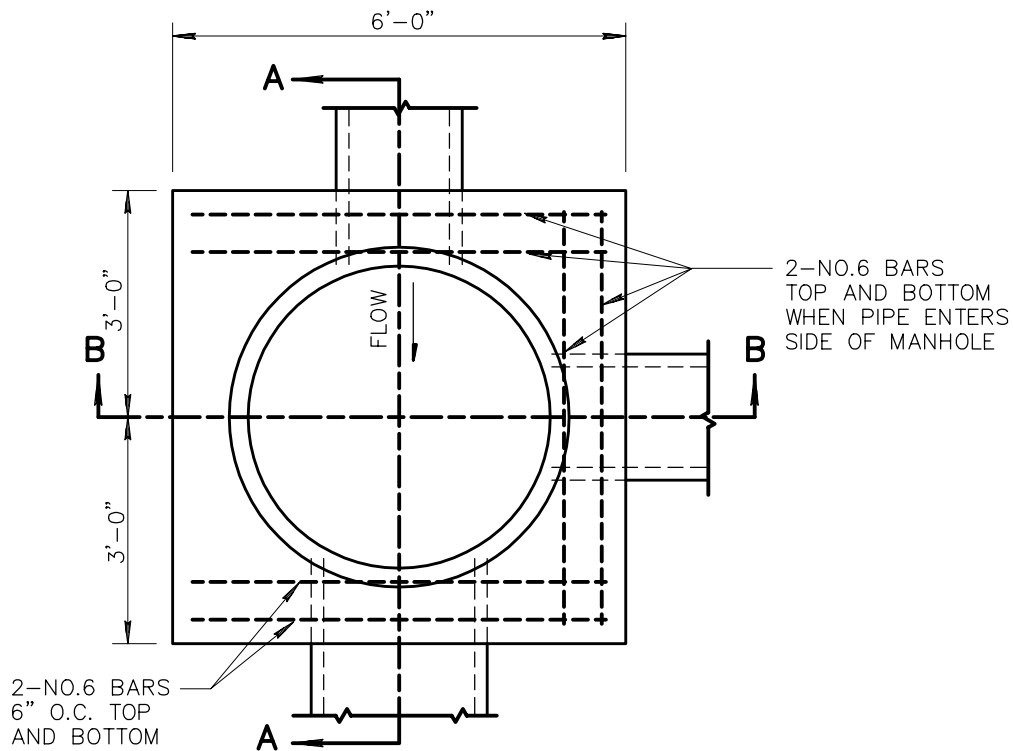
STANDARD DETAIL
ENGLISH

CORRUGATED METAL PIPE
AND INSTALLATION

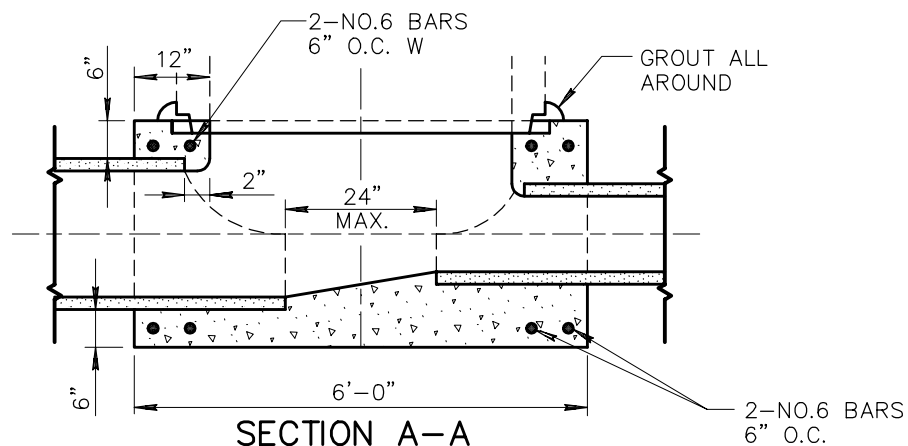
REVISED

DETAIL NO.

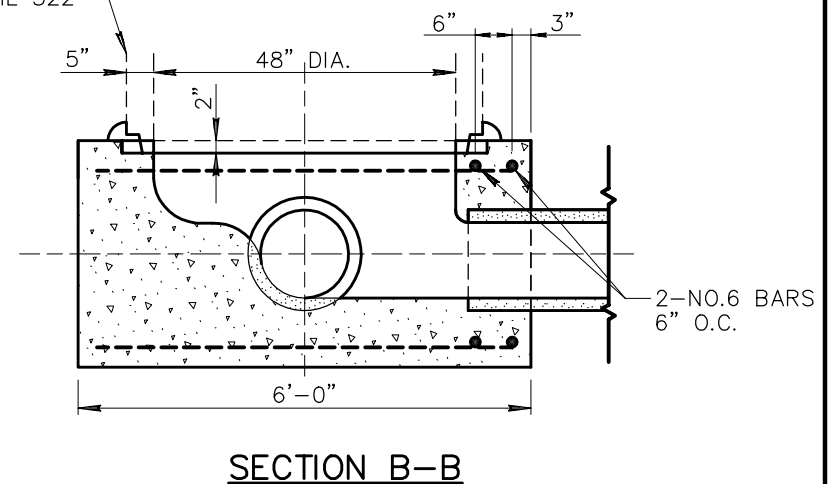
510



PLAN



MANHOLE SHAFT
PER DETAIL 522



NOTES

1. ALL CONCRETE TO BE CLASS 'A' PER SECT. 725, 505.
2. MATCH SPRING LINES OF PIPE ENTERING MANHOLE UNLESS OTHERWISE NOTED.
3. CUT PIPES TO ALLOW SETTING OF 4' DIA. CYLINDRICAL FORM FROM 6" ABOVE MAIN LINE PIPE TO SPRING LINE. CUT PIPE 2" LARGER THAN FORM TO ALLOW 2" CONCRETE OVER ENDS OF ALL CUT PIPE.
4. INVERT AND BASE OF MANHOLE TO BE POURED AND INVERT TO BE SHAPED BY HAND TO MAKE SMOOTH TRANSITION. FINISH WITH RUBBER FLOAT.
5. CENTER MANHOLE ON PIPE JOINT WHERE PIPE CHANGES SIZES, LEAVING A GAP OF 12" MINIMUM, 24" MAXIMUM.

DETAIL NO.

520



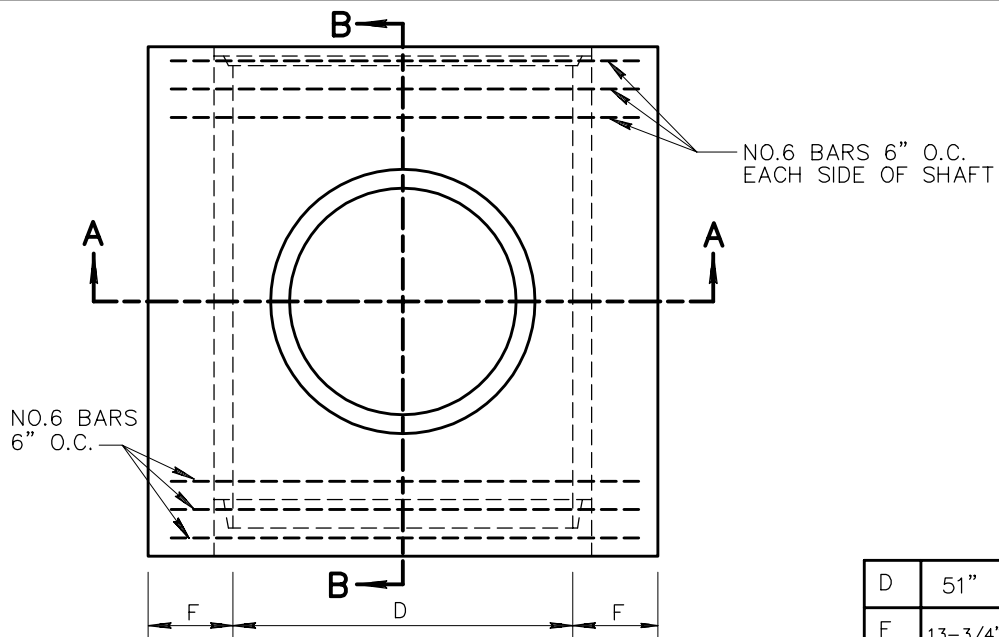
STANDARD DETAIL
ENGLISH

STORM DRAIN MANHOLE BASE
(48" AND SMALLER)

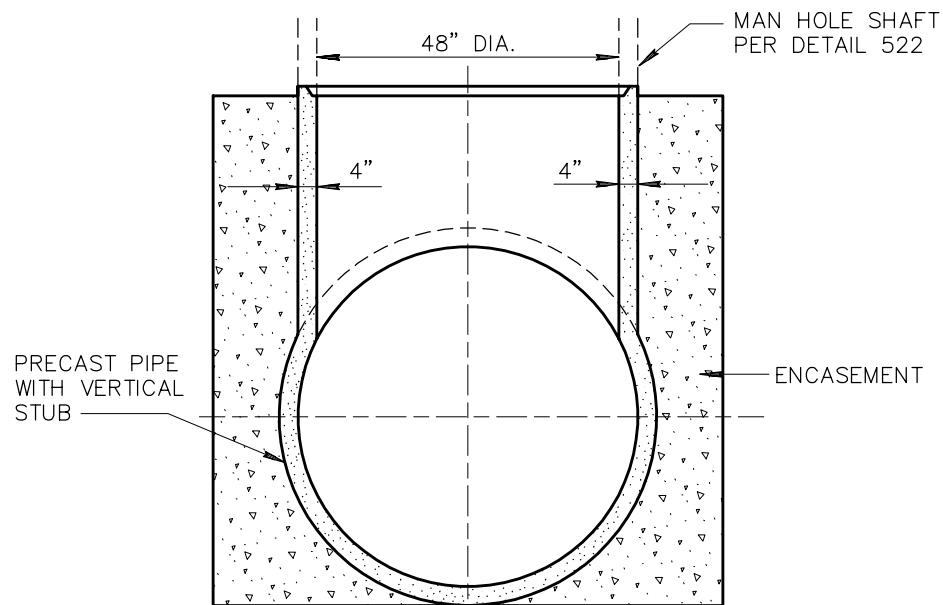
REVISED

DETAIL NO.

520



PLAN



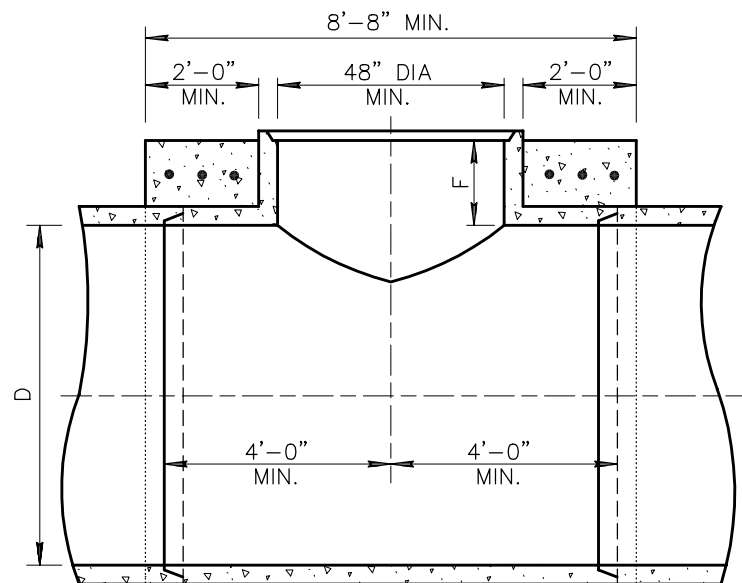
SECTION A-A

NOTES:

1. LINE PIPE AND STUB MAY BE CAST MONOLITHICALLY OR STUB MAY BE CAST ON TO LINE PIPE SECTION PRIOR TO COMPLETE CURING.
2. ALL LINE PIPE REINFORCEMENT SHALL BE TURNED UP INTO STUB.
3. THE VERTICAL STUB TO BE A.S.T.M. C-76 CLASS II WALL 'A' AND THE HORIZONTAL PIPE TO BE EQUAL TO STRENGTH OF PIPE ENTERING MANHOLE.
4. ALL REINFORCING STEEL SHALL CLEAR FACE OF CONCRETE BY 1-1/2" UNLESS SHOWN OTHERWISE.
5. CONCRETE ENCASEMENT SHALL BE CLASS 'A' PER SECT. 725 AND 505.

TABLE OF VALUES FOR 'F' & 'D'

D	51"	54"	57"	60"	63"	66"	69"	72"	78"	84"	90"	96"
F	13-3/4"	14-1/2"	15"	15-1/2"	16-1/4"	16-3/4"	17-1/2"	18"	19-1/4"	20-1/2"	21-3/4"	23"



SECTION B-B

DETAIL NO.

521



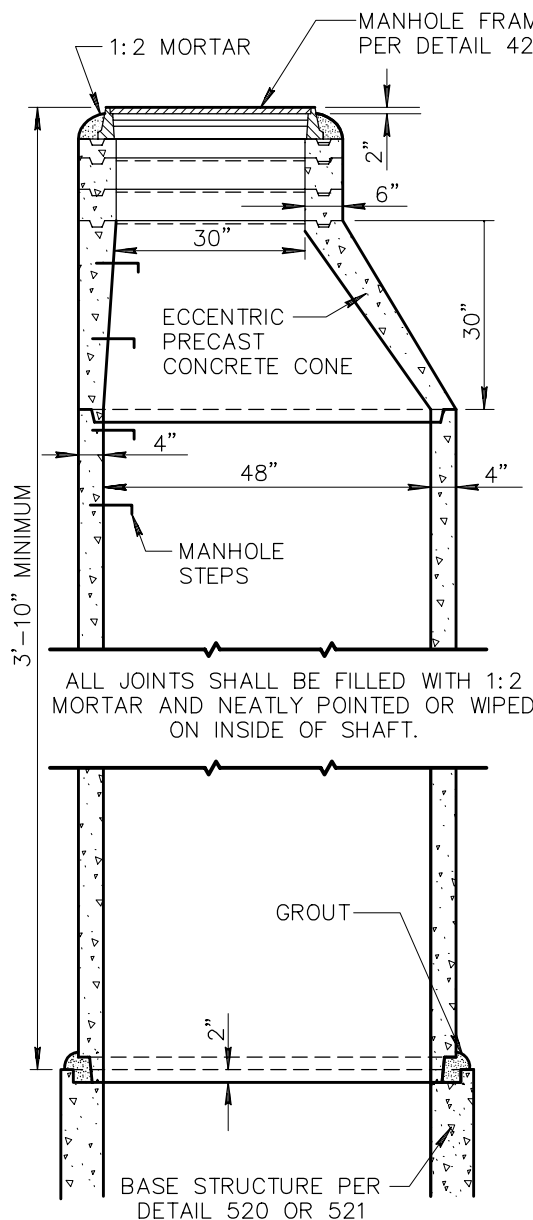
STANDARD DETAIL
ENGLISH

**STORM DRAIN MANHOLE BASE
(51" OR LARGER)**

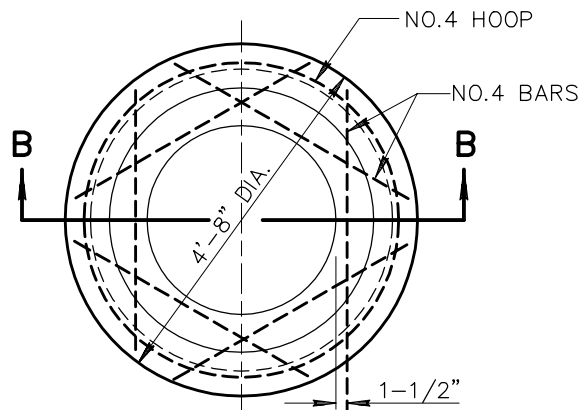
REVISED

DETAIL NO.

521

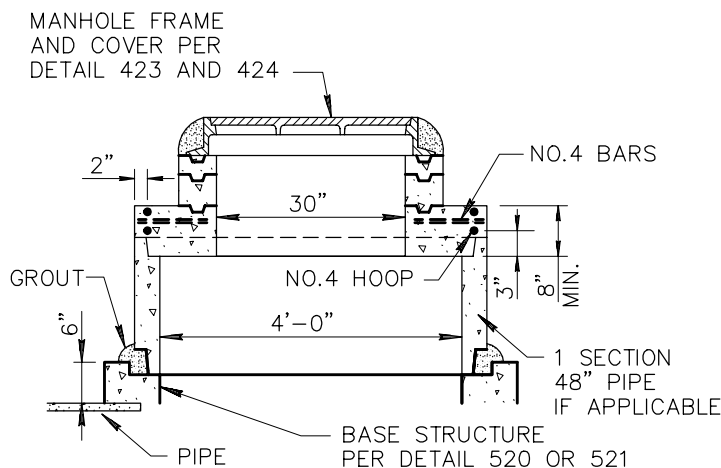


**VERTICAL SECTION OF
ECCENTRIC MANHOLE SHAFT**



PLAN

USE WHERE THERE IS 3'-10"
OR LESS COVER OVER PIPE

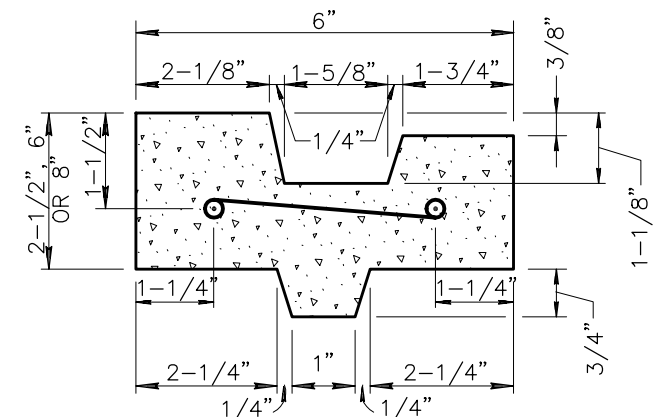


SECTION B-B

SHALLOW MANHOLE

NOTES:

1. PRECAST CONCRETE CONES AND SECTIONS TO BE A.S.T.M. C-478.
2. BRICK MAY BE USED IN LIEU OF OR IN COMBINATION WITH CONCRETE ADJUSTING RINGS.
3. PRECAST CONCRETE SECTIONS 48" DIA PIPE MAY BE FURNISHED IN STANDARD LENGTHS.
4. UNLESS OTHERWISE SHOWN ON PLANS, USE (2) 2-1/2" PRECAST CONCRETE ADJUSTING RINGS ON IMPROVED STREETS AND (4) 2-1/2" RINGS ON UNIMPROVED STREETS.
5. MANHOLE STEPS SHALL BEGIN 2'-0" BELOW FINISHED GRADE AND CONTINUE AT 12" INTERVALS TO APPROXIMATELY 2' ABOVE MANHOLE SHELF. (AS REQUIRED BY AGENCY.)
6. CONCRETE SHALL BE CLASS A PER SECTION 725 AND 505.



2-1/2" RINGS SHALL BE REINFORCED WITH TWO 1/4" ROUND STEEL HOOPS; 6" AND 8" RINGS SHALL BE REINFORCED WITH FOUR 1/4" HOOPS, TIED WITH NO. 14 A.S. & W. GAUGE WIRE 8" O.C.

**REINFORCED CONCRETE
ADJUSTING RING**

DETAIL NO.

522



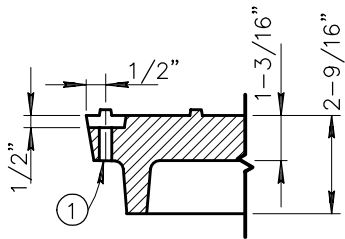
STANDARD DETAIL
ENGLISH

STORM DRAIN MANHOLE SHAFT

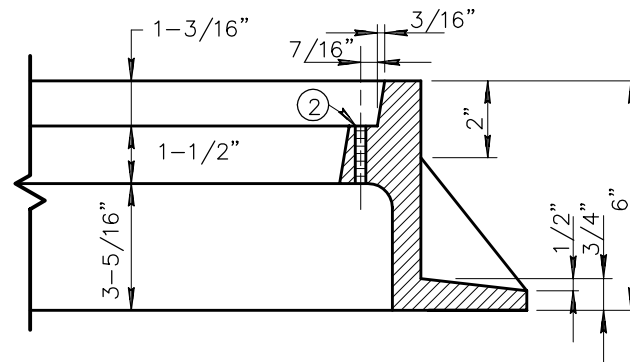
REVISED

DETAIL NO.

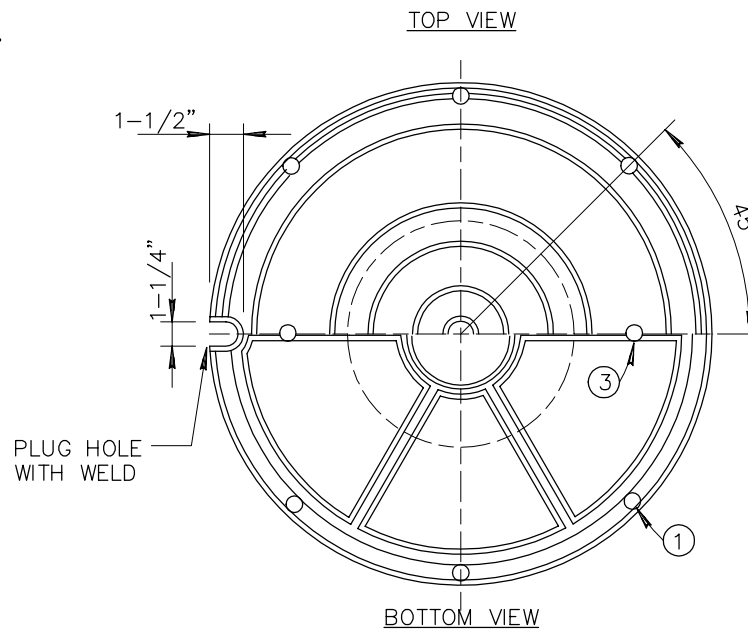
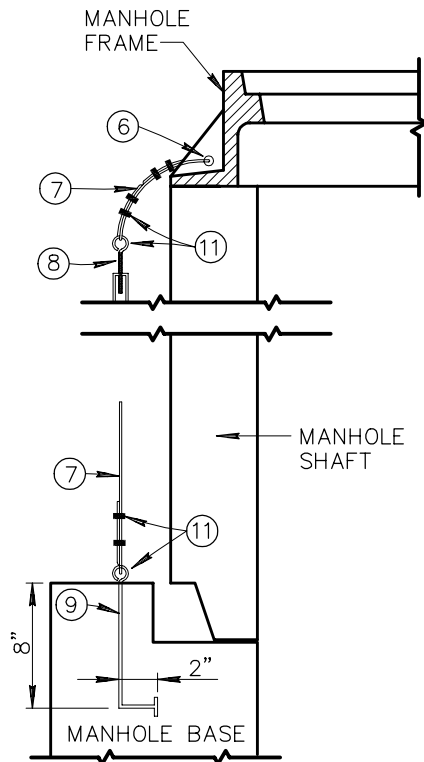
522



COVER SECTION



FRAME SECTION



**STANDARD 24" M.H.
FRAME AND COVER**

FOR A 30" M.H. OPENING, USE THE STD. WATER TIGHT 30" M.H. FRAME & COVER, AND ANCHOR THE FRAME AS OUTLINED IN THE INSTRUCTIONS NOTED ON THIS SHEET.

FOR A 24" M.H. OPENING, MODIFY THE STD. 24" M.H. FRAME & COVER, FOLLOWING THE NOTED PROCEDURES, ONE THRU FIVE.

NOTES:

- ① DRILL (8) HOLES 17/32" IN COVER FOR 1/2" CAPSCREWS, COUNTERBORE 1/2" DEEP BY 1-1/8" DIA. TO ACCOMODATE CAPSCREW AND SOCKET WRENCH. SPACE EQUALLY.
 - ② DRILL (8) HOLES AND TAP FOR 1/2" - 13 THREAD NATIONAL COARSE BOLT.
 - ③ DRILL, TAP AND COUNTERBORE (2) HOLES FOR 1/2" CAPSCREWS TO BE USED FOR LIFTING COVER. PLUG WITH CAPSCREWS.
 - ④ COVER AND FRAME MUST BE MATCHED, DRILLED AND TAPPED IN SETS.
 - ⑤ CASTING DIMENSIONS GIVEN ABOVE ARE FROM DET. 424, 24" MANHOLE FRAME AND COVER.
- BOTH 24" AND 30" FRAMES TO BE ANCHORED AS FOLLOWS:
- ⑥ DRILL 1/2" HOLE IN FILLET. DO NOT USE ADJACENT FILLETS.
 - ⑦ 1/4" STAINLESS STEEL CABLE. SECURED WITH CABLE CLAMPS.
 - ⑧ 1/2"x9" HOOK AND EYE TURNBUCKLE.
 - ⑨ 1/2" EYE BOLT WITH 1" DIA. EYE.
 - ⑩ INSTALL THREE CABLES PER 24" COVER (FOUR CABLES FOR 30" COVERS). EYEBOLTS TO BE SET DIRECTLY BELOW FILLETS USED.
 - ⑪ TRIPLE WRAP TURNBUCKLES AND CABLE CLAMPS WITH 1" WIDE TAPE, SAFE-T-CLAD, F.O.S. 655, OR APPROVED EQUAL.

DETAIL NO.

523-1



STANDARD DETAIL
ENGLISH

PRESSURE MANHOLE

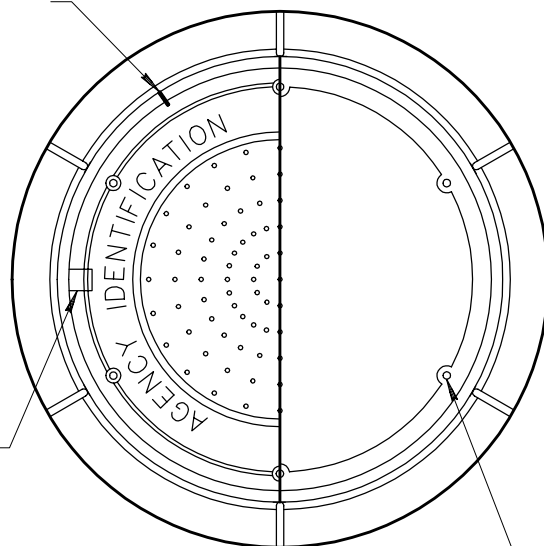
REVISED

DETAIL NO.

523-1

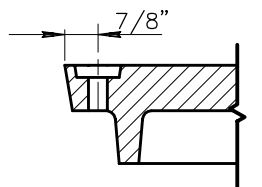
GROUND MATCH MARK
1/4" W x 1/8" D

(2) CONCEALED
PICKHOLES
180 DEG. APART

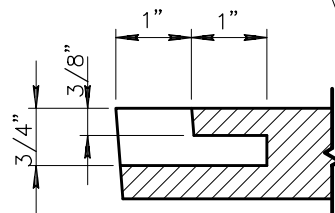


NOTES:

1. DRILL (6) HOLES IN 30" COVER (4 HOLES IN 24" COVER) 17/32" CORED RECESS FOR 1/2" CAPSCREWS. SPACE EQUALLY (304 S.S.)
2. DRILL (6) HOLES IN 30" FRAME (4 HOLES IN 24" FRAME) AND TAP FOR 1/2" - NATIONAL COARSE BOLT (HEX HEAD).
3. COVER AND FRAME MUST BE MATCH MARKED, DRILLED AND TAPPED IN SETS.
4. DIMENSIONS, LETTERING, WEIGHTS AND MATERIALS SHALL CONFORM TO DET. 424.
5. REFER TO DETAIL 523-1 FOR INSTALLATION PROCEDURES.

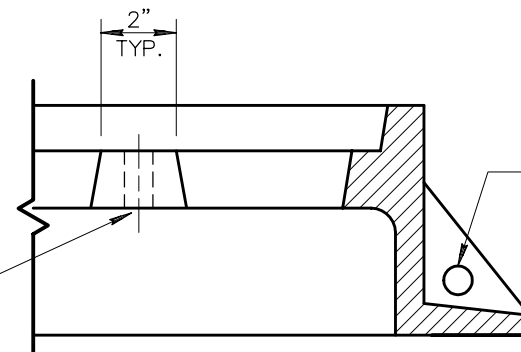


BOLT HOLE DETAIL



PICKHOLE DETAIL

TYP. BOLT PAD



3/4" DIA. CORED
HOLES IN GUSSET

COVER SECTION

FRAME SECTION

DETAIL NO.

523-2



STANDARD DETAIL
ENGLISH

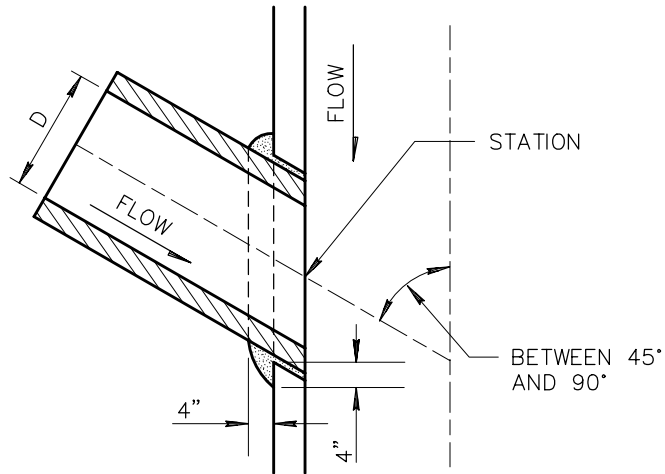
PRESSURE MANHOLE

REVISED

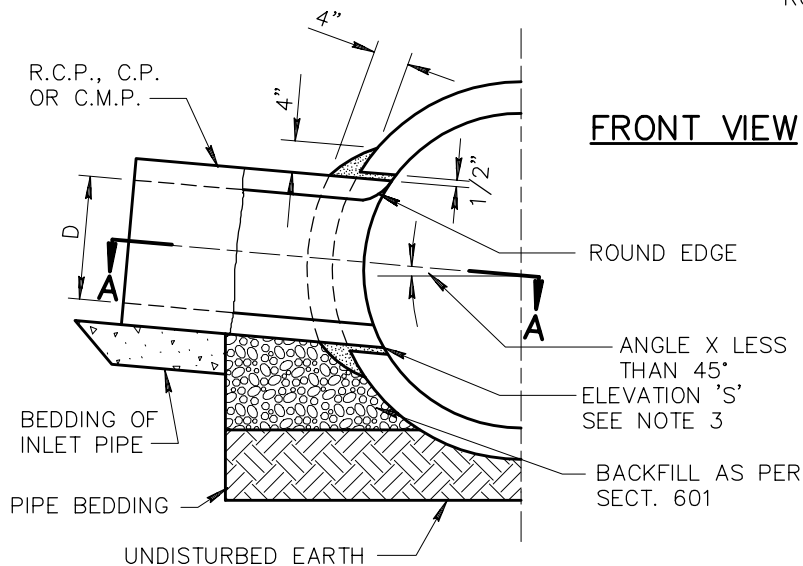
DETAIL NO.

523-2

TOP VIEW

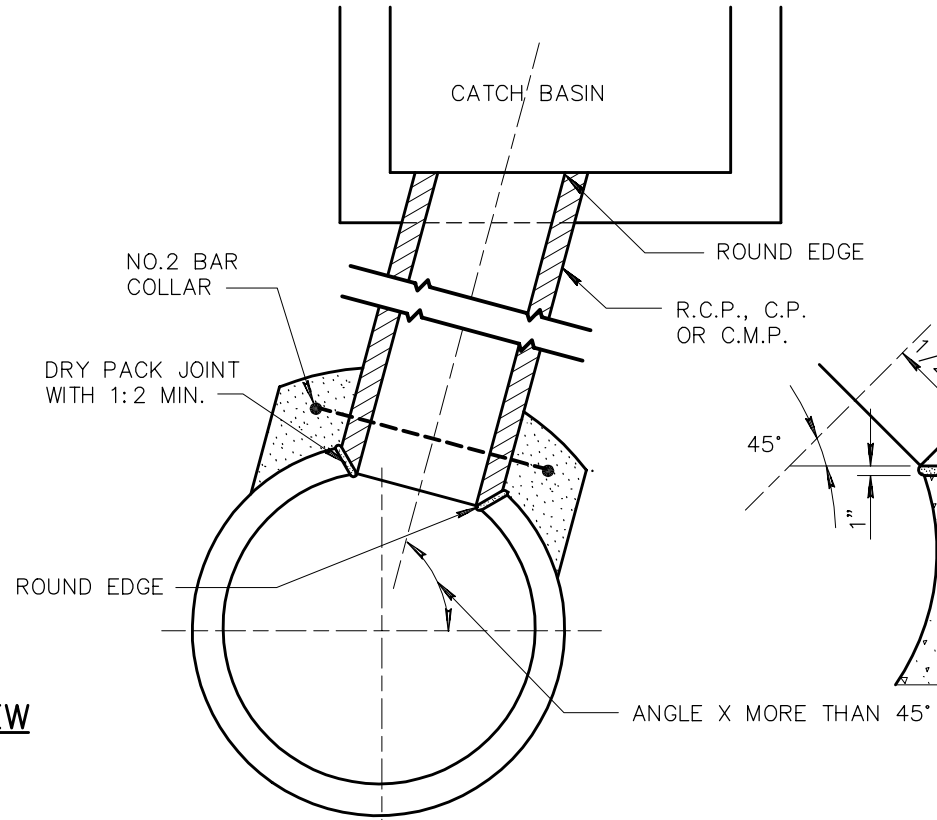


SECTION A-A



SIDE INLET
TYPE 1

FRONT VIEW



CATCH BASIN ABOVE STORM DRAIN
TYPE 2

NOTES:

1. D SHALL BE 24" OR LESS. FOR LARGER VALUE OF D USE MANHOLE OR JUNCTION STRUCTURE.
2. IN NO CASE SHALL THE OUTSIDE DIAMETER OF THE INLET EXCEED ONE HALF THE INSIDE DIAMETER OF THE MAIN STORM DRAIN.
3. CENTERLINE OF INLET SHALL BE ON RADIUS OF MAIN STORM DRAIN EXCEPT WHEN ELEVATION S IS SHOWN ON PLANS.
4. THE MINIMUM OPENING INTO THE STORM DRAIN SHALL BE THE OUTSIDE DIAMETER OF THE CONNECTING PIPE PLUS 1".
5. IF ANGLE X FROM HORIZONTAL IS 45° OR LESS USE TYPE 1.
IF ANGLE X IS 45° OR OVER USE TYPE 2.

DETAIL NO.

524



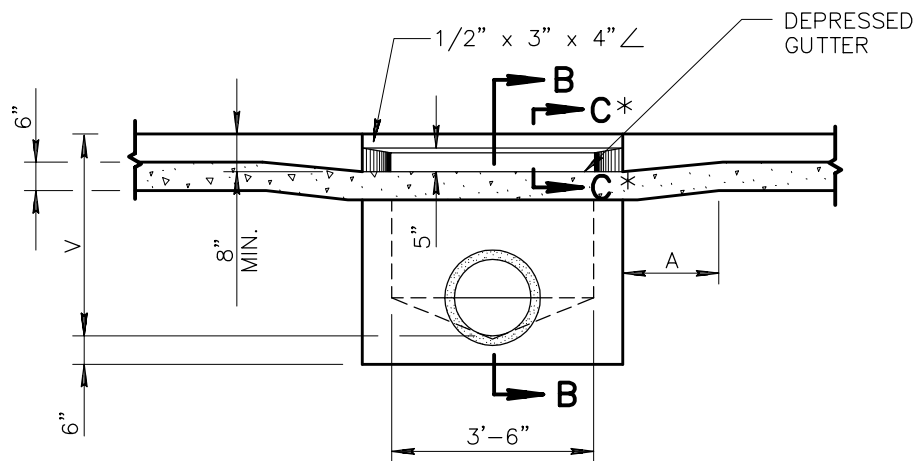
STANDARD DETAIL
ENGLISH

STORM DRAIN LATERAL
PIPE CONNECTIONS

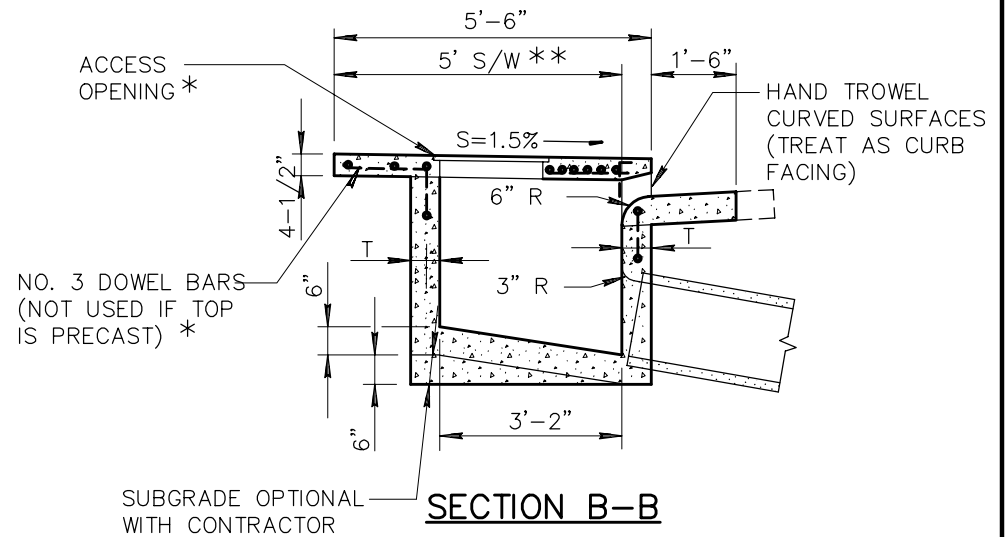
REVISED

DETAIL NO.

524

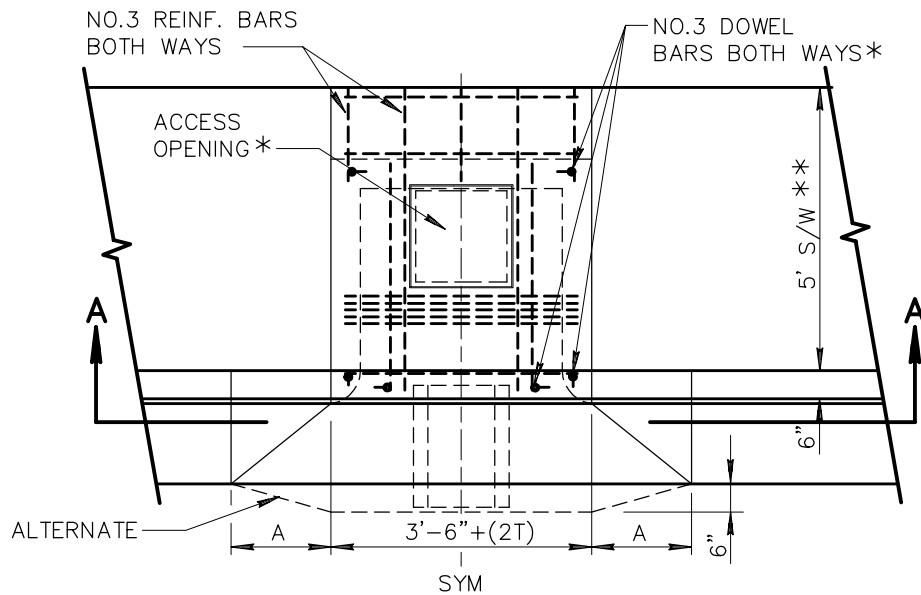


SECTION A-A



NOTES:

1. THE ENTIRE CATCH BASIN COVER MAY BE POURED IN PLACE OR PRECAST.
2. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.
3. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
4. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
5. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO. 1 D PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790.
6. CONCRETE SHALL BE CLASS A PER SECTION 725.



PLAN VIEW

CURB	A
4"	3'-3"
6"	1'-9"
7"	1'-0"

DIMENSIONS

T=6" IF V=4' OR LESS
T=8" IF V IS BETWEEN 4' AND 8'
T=10" IF V IS 8' OR MORE (IF V EXCEEDS 10' SPECIAL DESIGN IS REQUIRED)
V=3'-6" UNLESS OTHERWISE SPECIFIED.

- * SEE DETAILS 536-1 AND 536-2 FOR DETAILS AND SECTIONS COMMON TO ALL CURB OPENING CATCH BASINS.
** 4' LOCATIONS WHERE 4' S/W IS REQUIRED.

DETAIL NO.

530



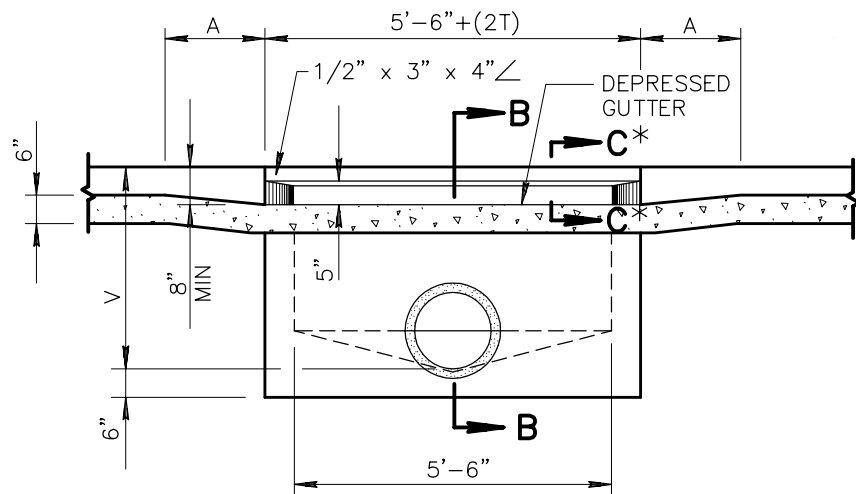
STANDARD DETAIL
ENGLISH

**3'-6" CURB OPENING
CATCH BASIN – TYPE 'A'**

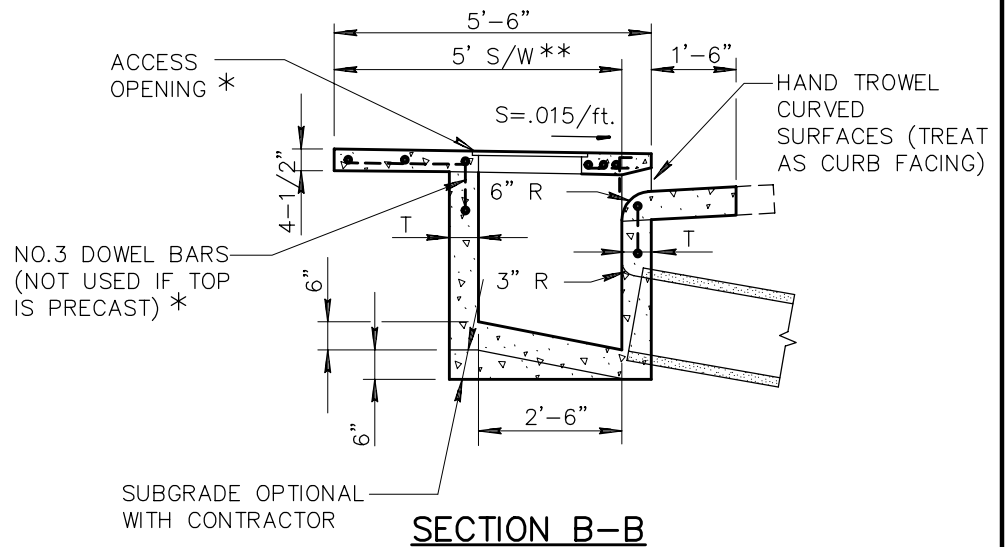
REVISED

DETAIL NO.

530



SECTION A-A



NOTES:

1. THE ENTIRE CATCH BASIN COVER MAY BE POURED IN PLACE OR PRECAST.
2. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.
3. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
4. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
5. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO. 1 D PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790.
6. CONCRETE SHALL BE CLASS A PER SECTION 725.

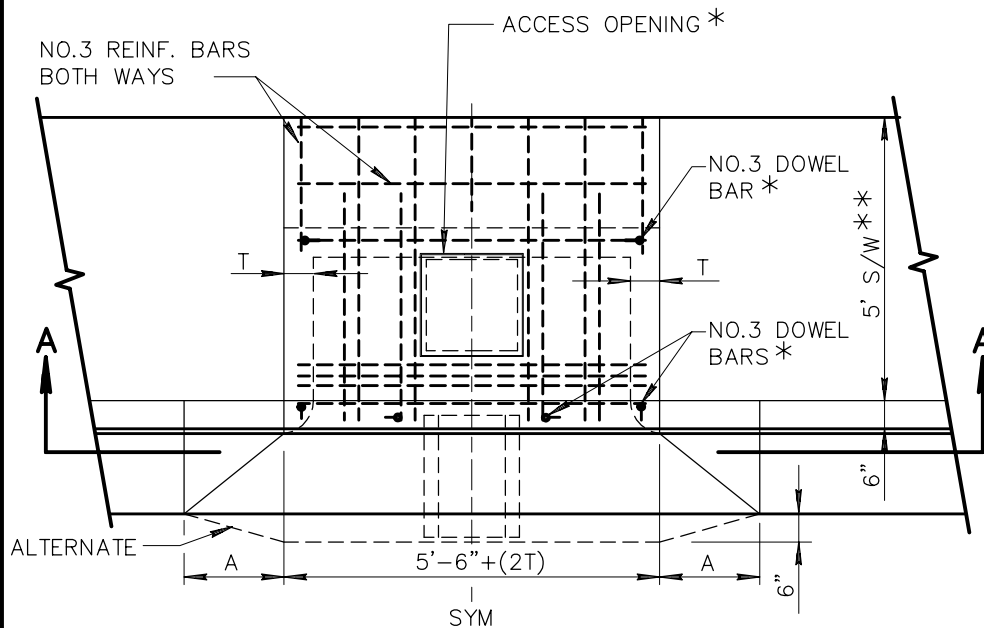
DIMENSIONS

T=6" IF V=4' OR LESS
T=8" IF V IS BETWEEN 4' AND 8'
T=10" IF V IS 8' OR MORE (IF V EXCEEDS 10' SPECIAL DESIGN IS REQUIRED)
V=3'-6" UNLESS OTHERWISE SPECIFIED.

CURB	A
4"	3'-3"
6"	1'-9"
7"	1'-0"

* SEE DETAILS 536-1 AND 536-2 FOR DETAILS AND SECTIONS COMMON TO ALL CURB OPENING CATCH BASINS.

** 4' LOCATIONS WHERE 4' S/W IS REQUIRED.



PLAN VIEW

DETAIL NO.

531



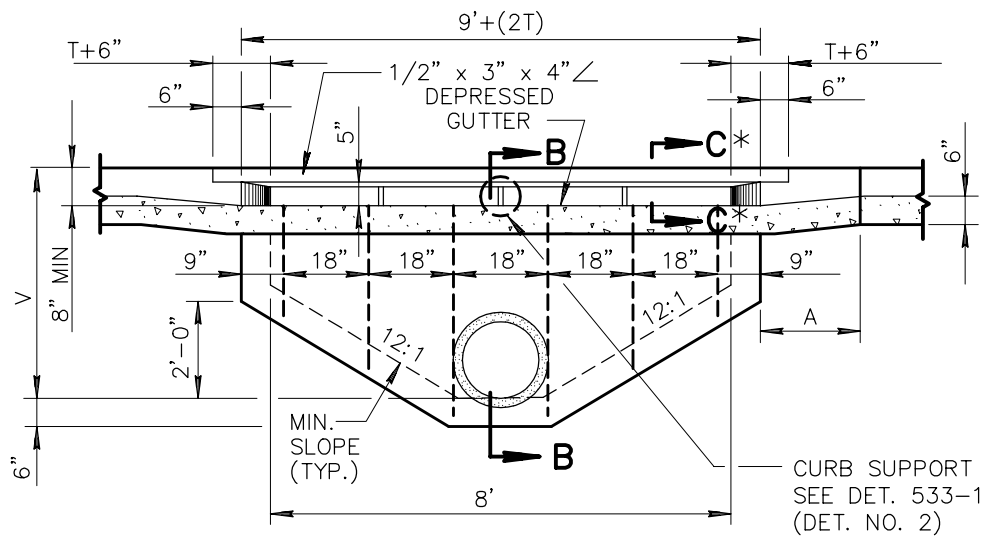
STANDARD DETAIL
ENGLISH

**5'-6" CURB OPENING
CATCH BASIN - TYPE 'B'**

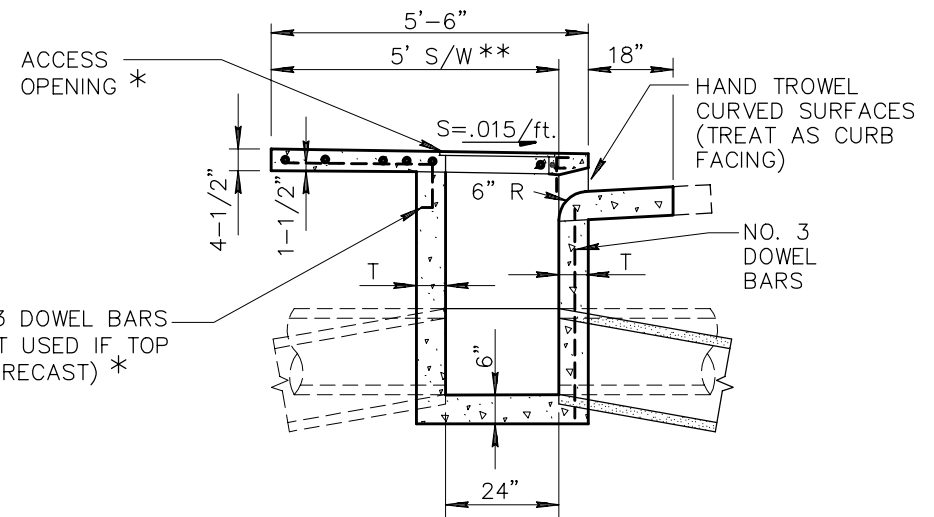
REVISED

DETAIL NO.

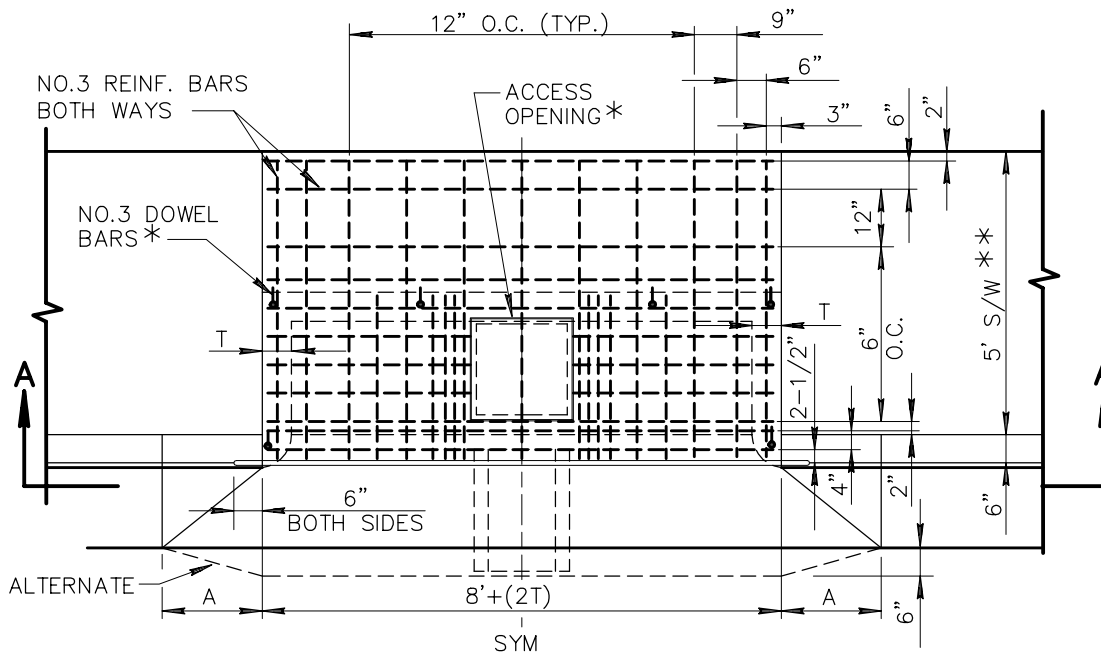
531



SECTION A-A



SECTION B-B



PLAN VIEW

NOTES:

1. THE ENTIRE CATCH BASIN COVER MAY BE POURED IN PLACE OR PRECAST.
2. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.
3. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
4. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
5. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO.1 D PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790.
6. CONCRETE SHALL BE CLASS A PER SECTION 725.

CURB	A
4"	3'-3"
6"	1'-9"
7"	1'-0"

DIMENSIONS

T=6" IF V=4' OR LESS
T=8" IF V IS BETWEEN 4' AND 8'
T=10" IF V IS 8' OR MORE (IF V EXCEEDS 10' SPECIAL DESIGN IS REQUIRED)
V=4' UNLESS OTHERWISE SPECIFIED.

* SEE DETAILS 536-1 AND 536-2 FOR DETAILS AND SECTIONS COMMON TO ALL CURB OPENING CATCH BASINS.

** 4' LOCATIONS WHERE 4' S/W IS REQUIRED.

DETAIL NO.

532



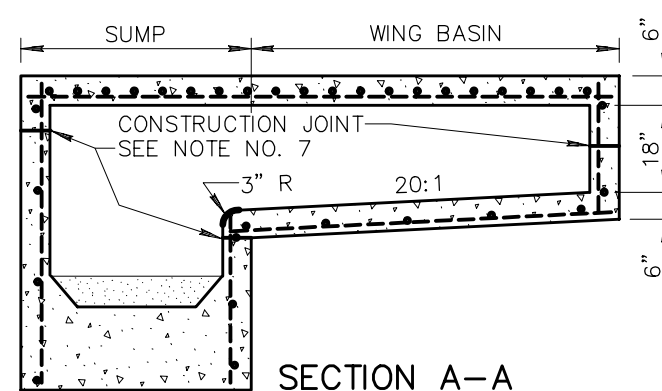
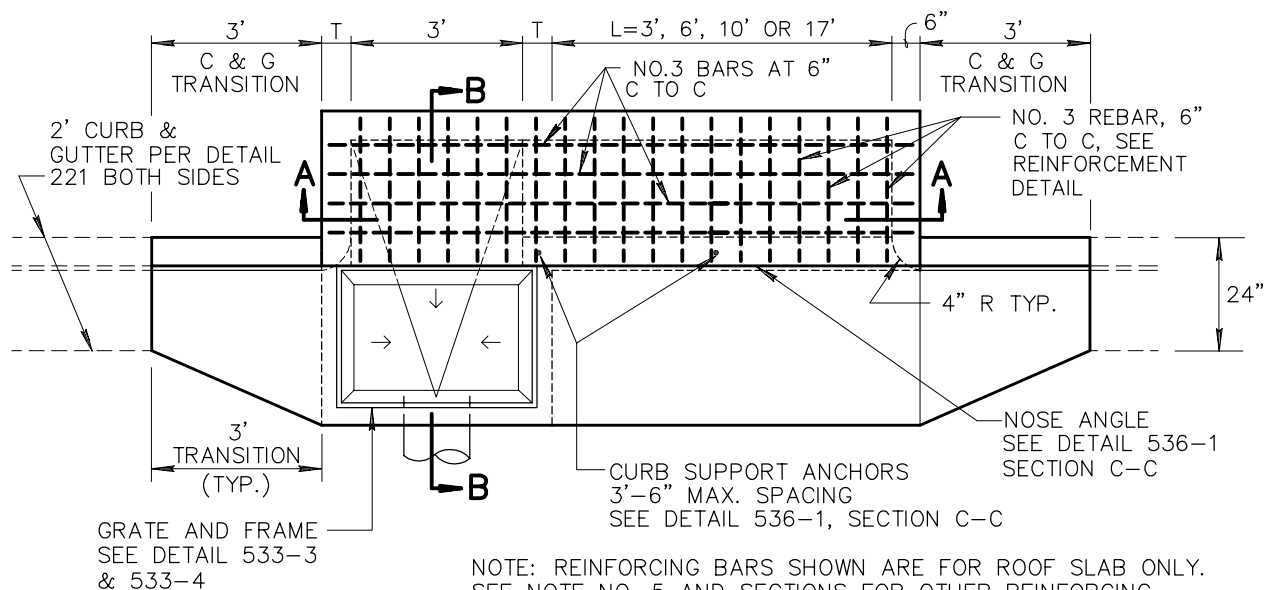
STANDARD DETAIL
ENGLISH

**8'-0" CURB OPENING
CATCH BASIN - TYPE 'C'**

REVISED

DETAIL NO.

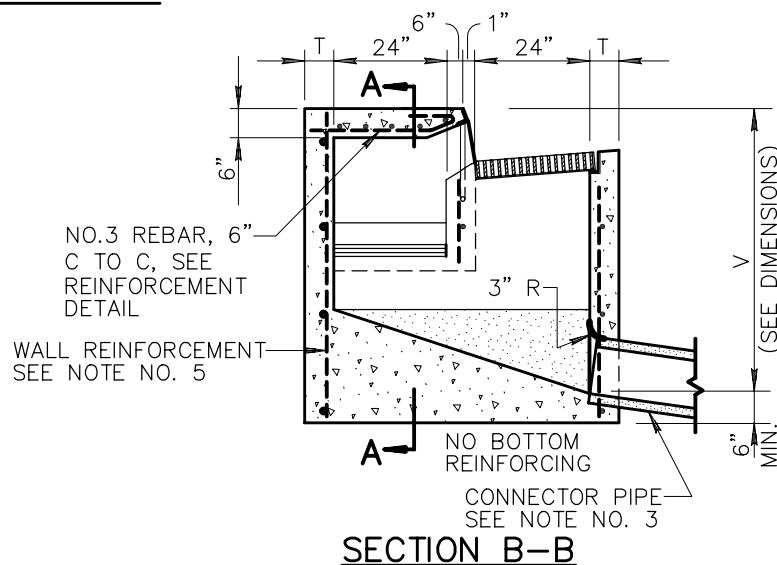
532



NOTES:

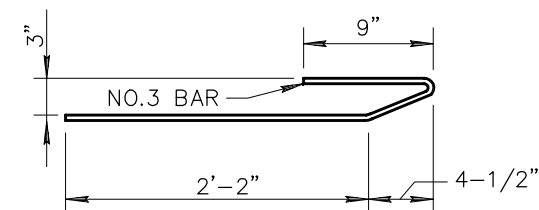
1. SINGLE C.B. (ILLUSTRATED), SUMP WITH WING BASIN UPSTREAM.
2. DOUBLE C.B. SUMP WITH SYMMETRICAL WING BASINS EACH SIDE.
3. PIPES CAN BE PLACED IN ANY WALL EXCEPT WALL ADJACENT TO A WING BASIN. PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS PLACED.
4. SUMP FLOOR SHALL HAVE A WOOD TROWEL FINISH AND A MIN. SLOPE OF 4:1 IN ALL DIRECTIONS TOWARD OUTLET PIPE.
5. ALL REFORCING BARS SHALL BE NO.4 18" C TO C BOTH WAYS AND 1-1/2" CLEAR TO INSIDE OF WALLS AND OUTSIDE WING BASIN FLOOR EXCEPT AS SHOWN. SEE SECT. 727.
6. ALL CONCRETE SHALL BE CLASS 'A', PER SECT. 725.
7. CONSTRUCTION JOINTS SHALL BE PLACED TO MEET FIELD CONDITIONS.
8. ALL EXPOSED STEEL SHALL BE GALVANIZED OR PAINTED WITH ONE SHOP COAT OF #1 PAINT AND TWO FIELD COATS OF #10 PAINT.

PLAN VIEW



DIMENSIONS

- V = 3'-3" MIN. WHEN L = 3'
- V = 3'-5" MIN. WHEN L = 6'
- V = 3'-7" MIN. WHEN L = 10'
- V = 4'-0" MIN. WHEN L = 17'
- T = 6" WHEN V IS LESS THAN 8'
- T = 8" WHEN V IS EQUAL TO OR GREATER THAN 8'
- H = CURB HEIGHT PRIOR TO THE TRANSITION



REINFORCEMENT DETAIL

DETAIL NO.

533-1



STANDARD DETAIL
ENGLISH

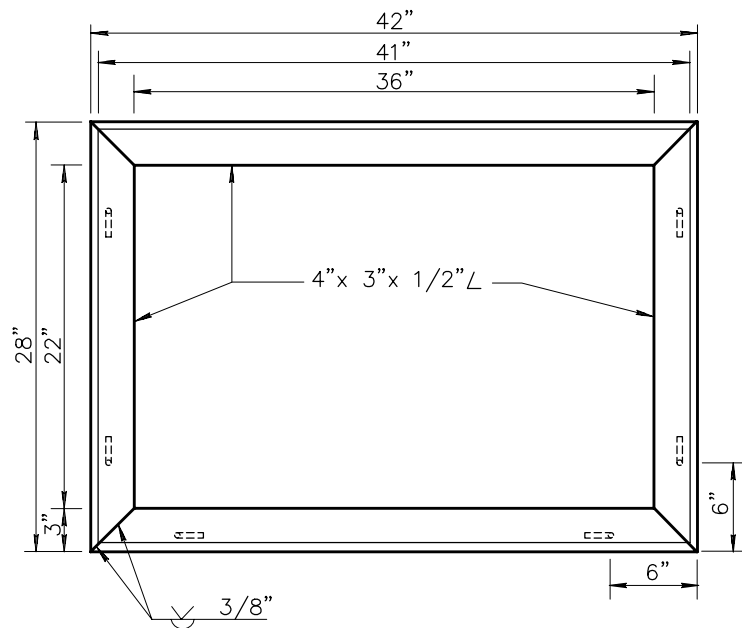
CATCH BASIN TYPE 'D

REVISED

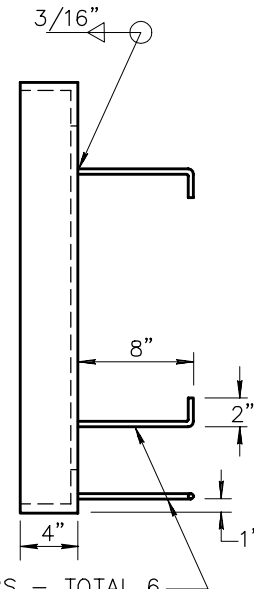
DETAIL NO.

533-1

533-2



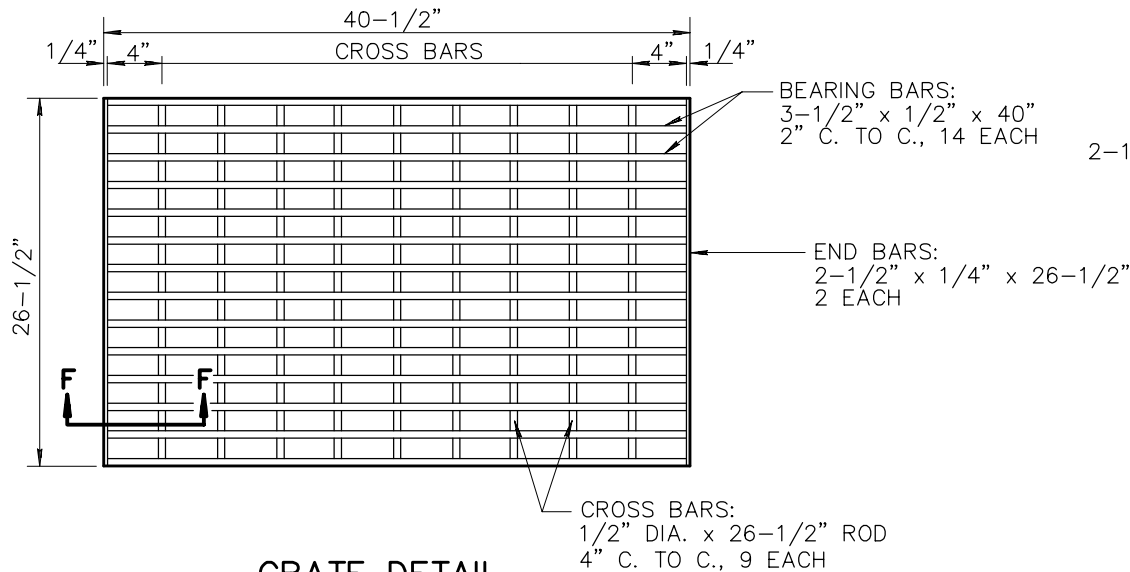
FRAME DETAIL



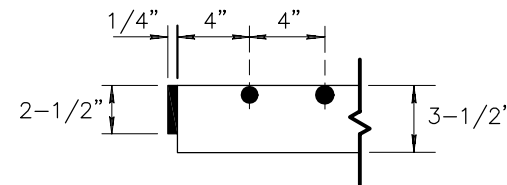
ANCHORS - TOTAL 6
SEE NOTE NO. 17

FRAME AND GRATE NOTES

14. FRAME AND GRATING SHALL BE TESTED FOR ACCURACY OF FIT AND SHALL BE MARKED IN SETS BEFORE DELIVERY.
15. ALL WELDING SHALL BE IN ACCORDANCE WITH STANDARD WELDING SPECIFICATIONS.
16. CROSS BARS AND END BARS MAY BE FILLET WELDED, RESISTANCE WELDED OR ELECTRO FORGED TO BEARING BARS.
17. ANCHORS SHALL BE 3/8" DIA. STEEL ROD, NO. 3 REBAR, 3/8" DIA. x 8" BOLTS OR 8" NELSON STUDS.
18. ALL PARTS SHALL BE OF STRUCTURAL GRADE STEEL.
19. ALL EXPOSED STEEL SHALL BE GALVANIZED OR PAINTED WITH ONE COAT #1 PAINT AND TWO FIELD COATS OF #10 PAINT.



GRATE DETAIL



SECTION F-F

DETAIL NO.

533-3



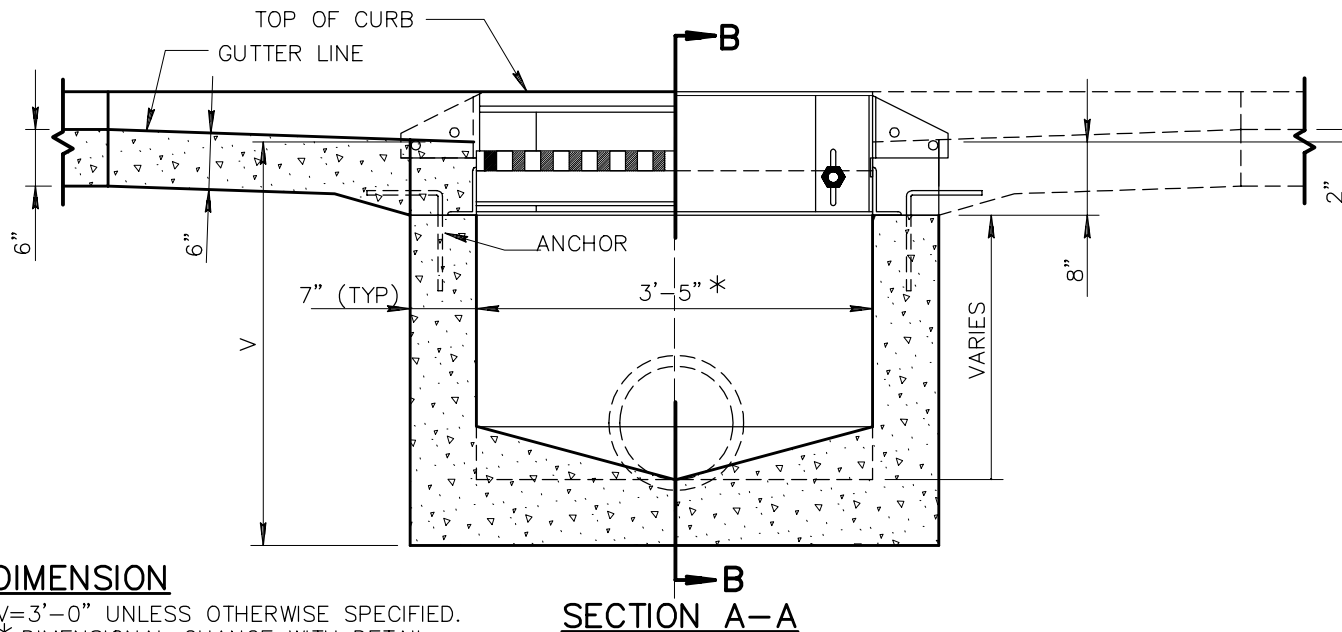
STANDARD DETAIL
ENGLISH

**FRAME AND GRATE
FOR TYPE 'D' CATCH BASIN**

REVISED

DETAIL NO.

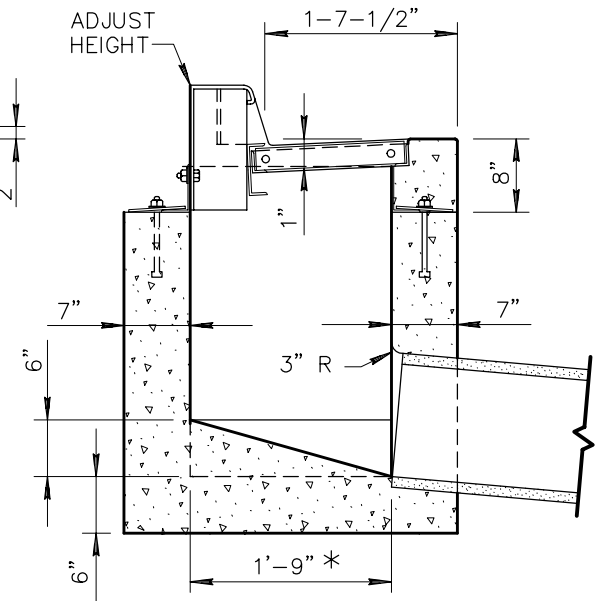
533-3



DIMENSION

V=3'-0" UNLESS OTHERWISE SPECIFIED.

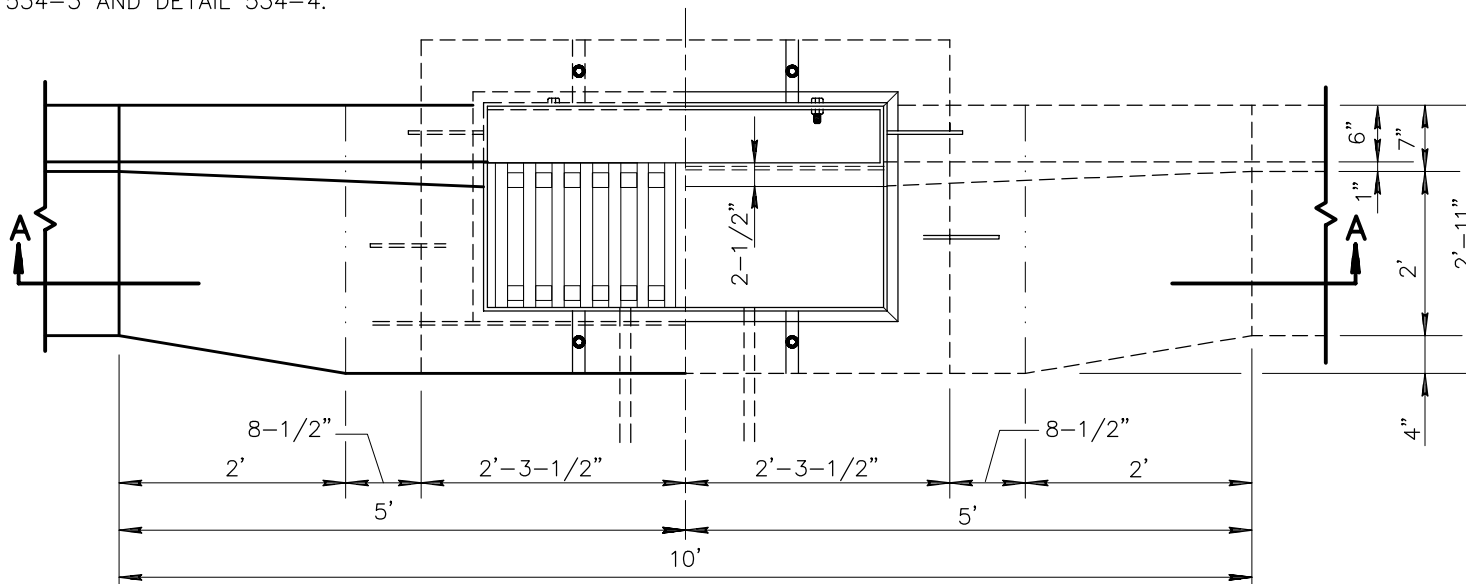
* DIMENSIONAL CHANGE WITH DETAIL 534-3 AND DETAIL 534-4.



SECTION B-B

NOTES:

1. ADJUSTABLE CURB, FRAME AND GRATING UNITS SHALL BE STRUCTURAL STEEL OR CAST IRON
2. PIPES MAY ENTER OR LEAVE ANY WALL. BOTTOM OF BOX TO BE SLOPED TO OUTLET PIPE FROM ALL DIRECTIONS AND TROWELLED TO A HARD SMOOTH SURFACE.
3. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.
4. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
5. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO. 1 PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790.
6. ALL CONCRETE, CLASS 'A' AS PER SECTION 725.



HALF PLAN GUTTER & GRATE

HALF PLAN FRAME & ANCHORS

DETAIL NO.

534-1



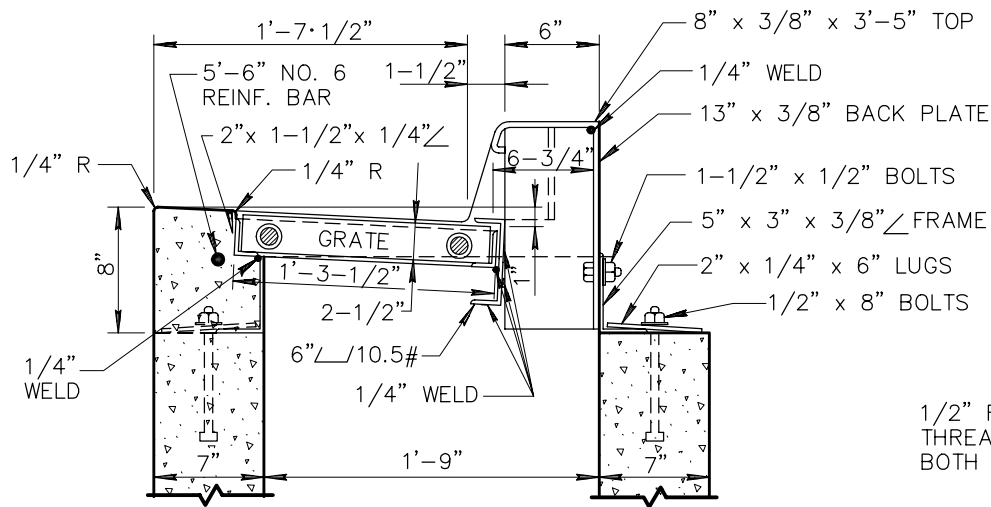
STANDARD DETAIL
ENGLISH

CATCH BASIN TYPE 'E'

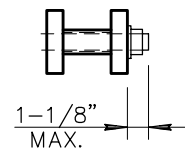
REVISED

DETAIL NO.

534-1

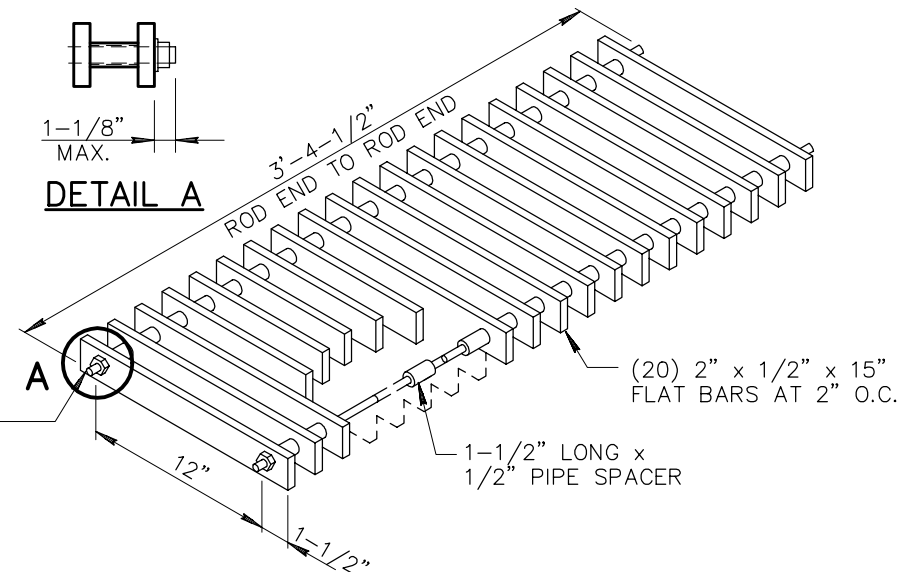


CROSS SECTION

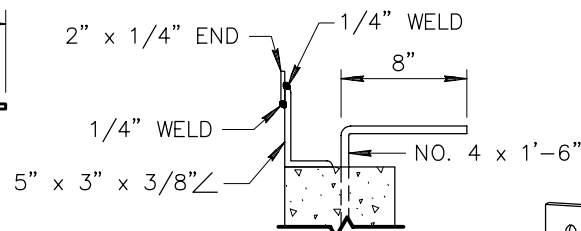
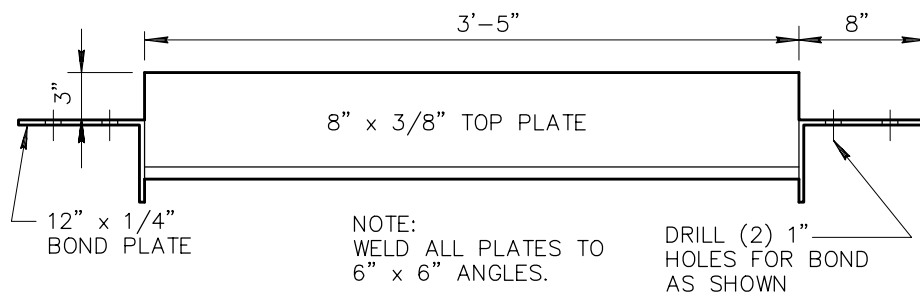


DETAIL A

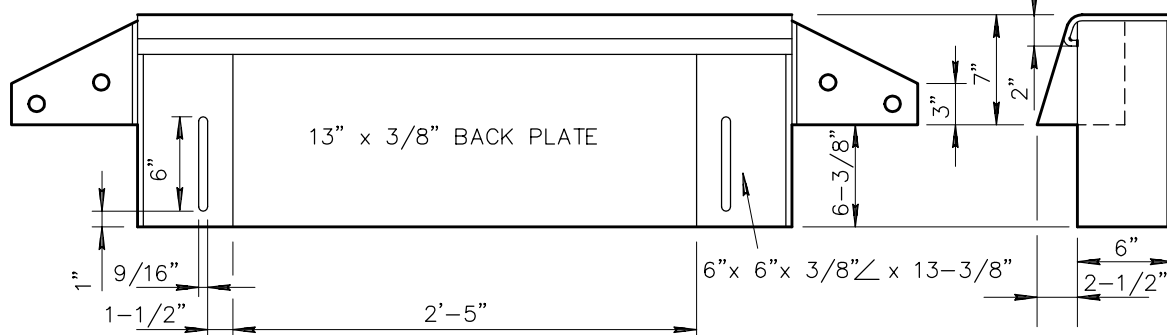
1/2" RODS
THREADED
BOTH ENDS



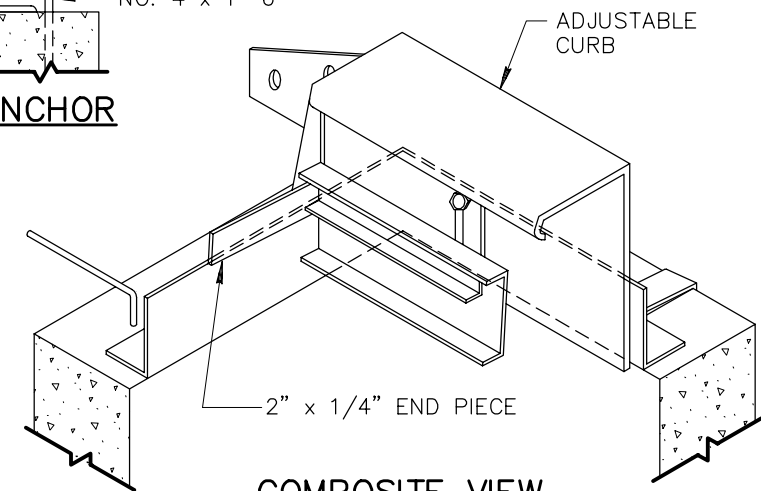
GRATE



ANCHOR



ADJUSTABLE CURB



COMPOSITE VIEW

DETAIL NO.

534-2



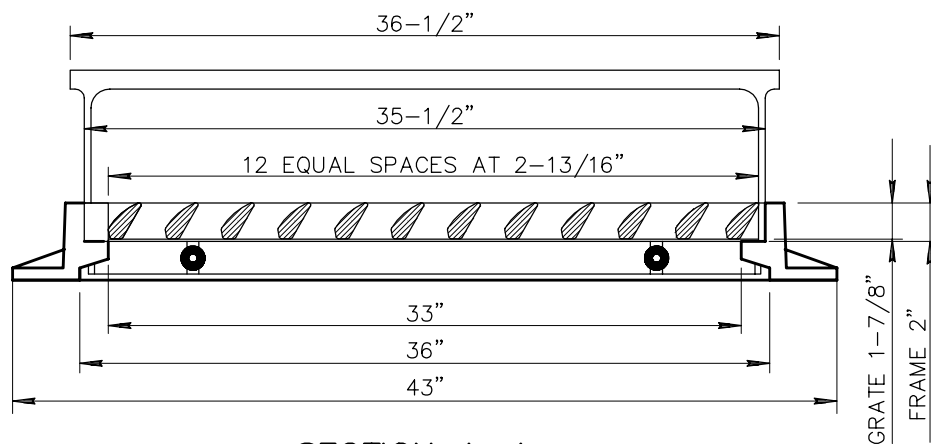
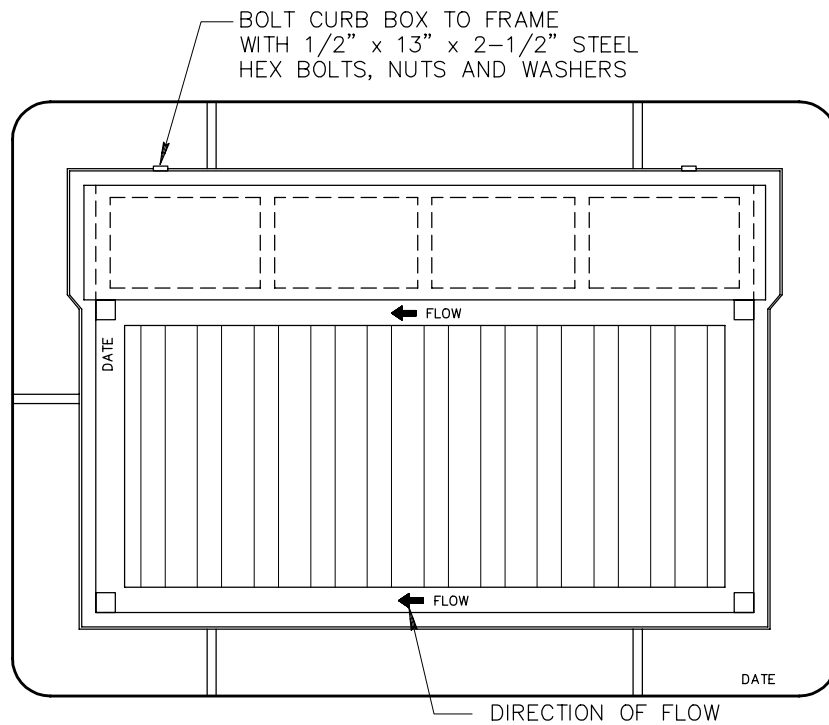
STANDARD DETAIL
ENGLISH

CATCH BASIN TYPE 'E' (DETAILS)

REVISED

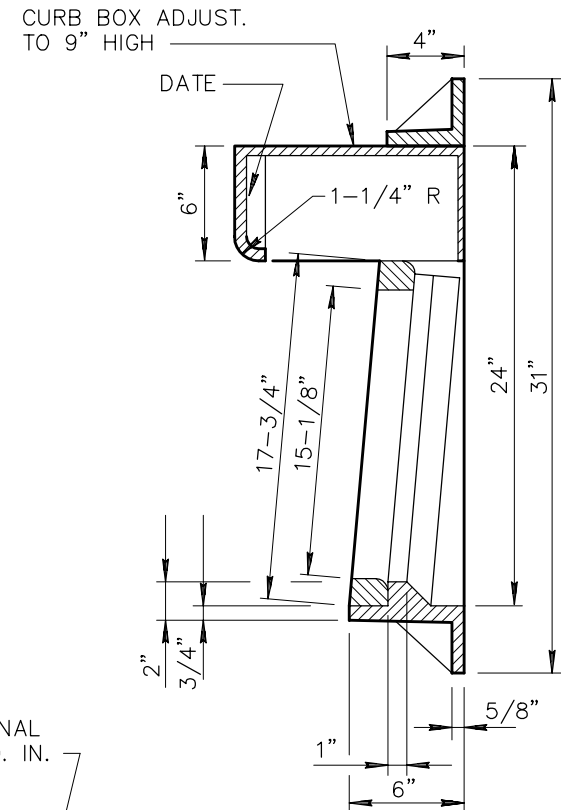
DETAIL NO.

534-2

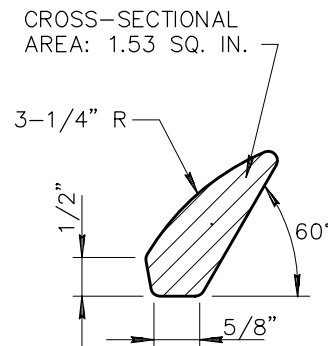


SECTION A-A

CAST IRON FRAME — GRATE — CURB BOX



SECTION B-B



VANE DETAIL

NOTE:

DIMENSIONAL CHANGE REQUIRED FROM 3'-5" WIDTH TO 3'-0" AND 1'-9" DEPTH TO 2'-0"
 MATERIAL CAST GRAY IRON ASTM A-48-83 CLASS 35B.
 FRAME WEIGHT 209 LBS; GRATE 140 LBS; CURB BOX 92 LBS.

DETAIL NO.
534-3

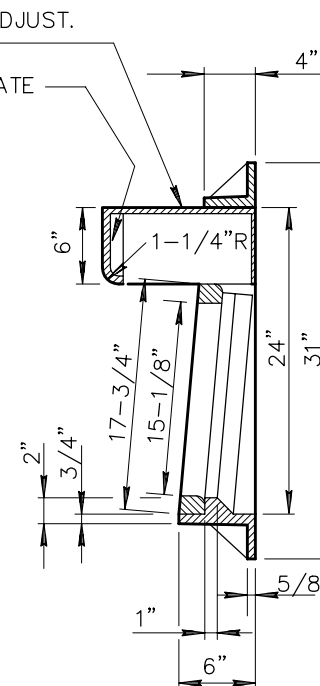


STANDARD DETAIL
ENGLISH

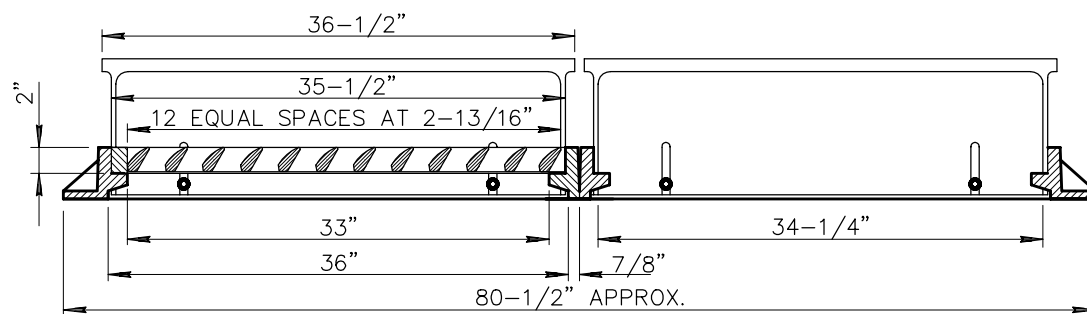
CATCH BASIN TYPE 'E' (DETAILS)

REVISED

DETAIL NO.
534-3



CROSS-SECTIONAL
AREA: 1.53 SQ. IN.



Technical drawing of a 3D object with the following dimensions:

- Top radius: $3\frac{1}{4}"$ R
- Left vertical height: $\frac{1}{2}"$
- Bottom horizontal width: $\frac{5}{8}"$
- Right side angle: 60°

VANE DETAIL

DIMENSIONAL CHANGE REQUIRED FROM 3'-5"
WIDTH TO 6'-2", AND 1'-9" DEPTH TO 2'-0"
REQUIRES ONE CENTER STEEL I-BEAM 4" x 7.7 LBS.
MATERIAL CAST GRAY IRON ASTM A-48-83 CLASS 35B.
FRAME WEIGHT 197 LBS.; GRATE 140 LBS.; CURB BOX 92 LBS.

534-4



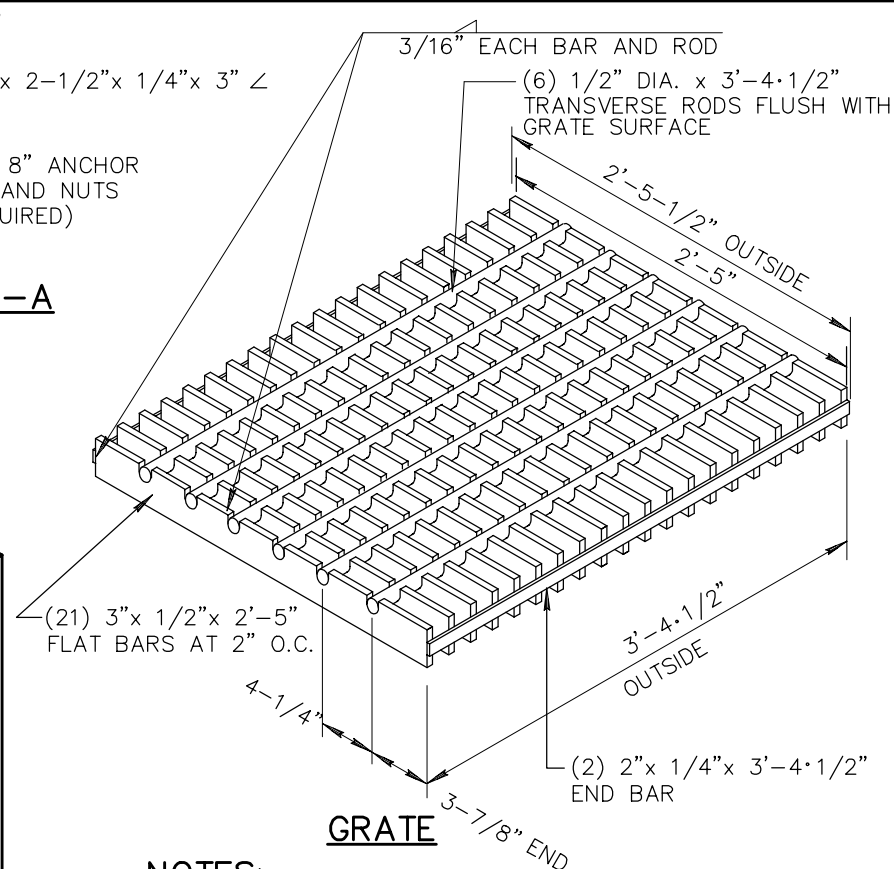
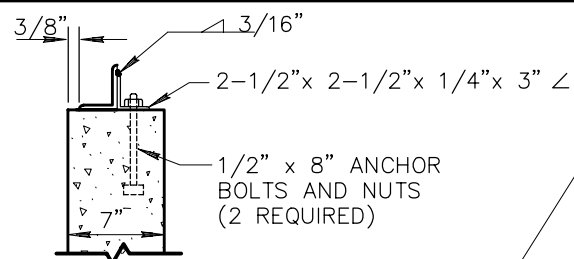
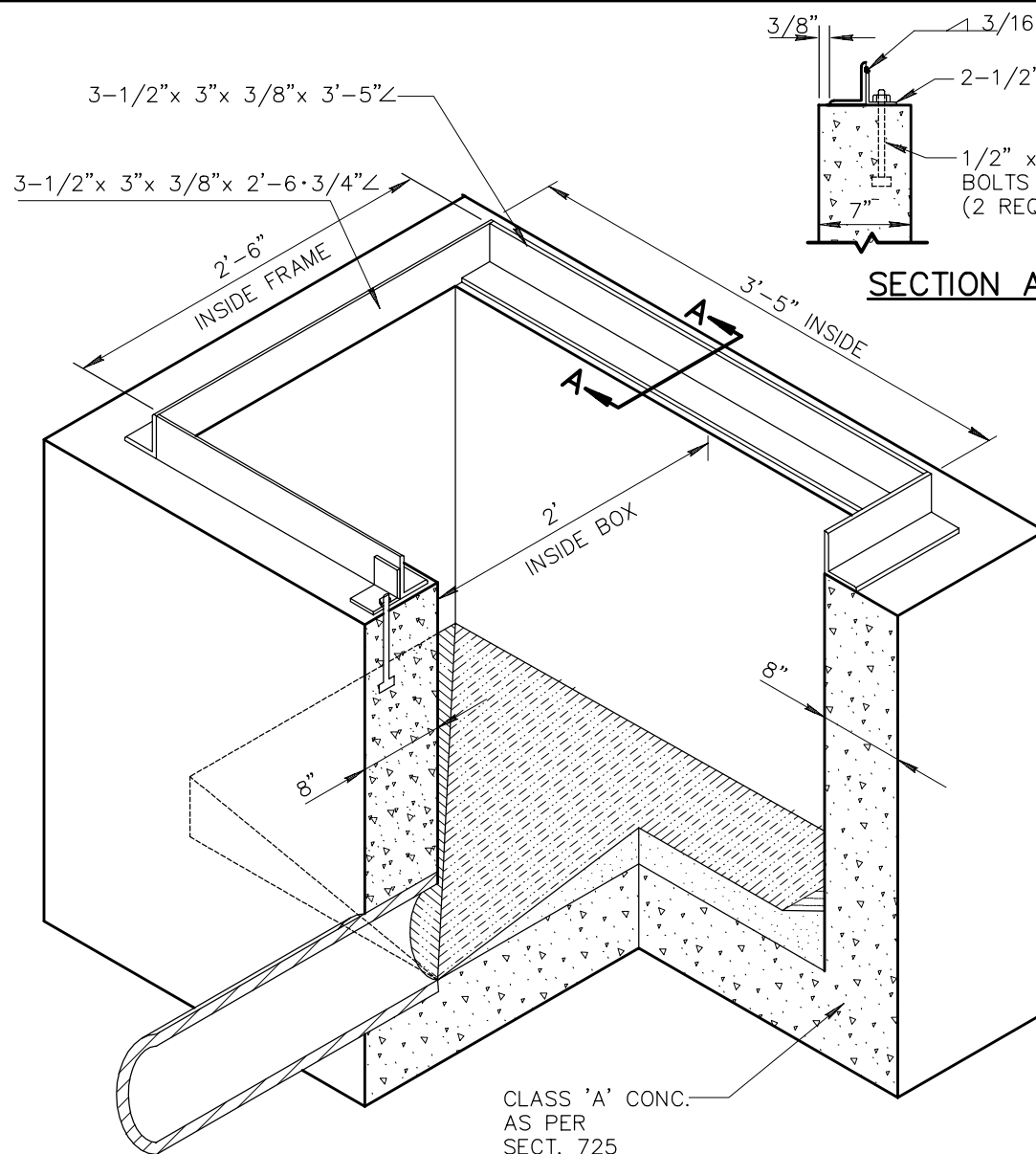
STANDARD DETAIL
ENGLISH

CATCH BASIN TYPE 'E' (DETAILS)

REVISED

DETAIL NO.

534-4



NOTES:

1. PIPES MAY ENTER OR LEAVE ANY WALL. BOTTOM OF BOX TO BE SLOPED TO OUTLET PIPE FROM ALL DIRECTIONS AND TROWELLED TO A HARD SMOOTH SURFACE.
2. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.
3. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
4. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO. 1 PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790.
5. ALL WELDS ON FRAME AND SIDE BARS ON GRATE SHALL BE FULL LENGTH OF JOINT.

NOTE:
CONSTRUCT BOX AS PER CATCH BASIN TYPE 'E'
(LOWER PORTION ONLY).

DETAIL NO.

535



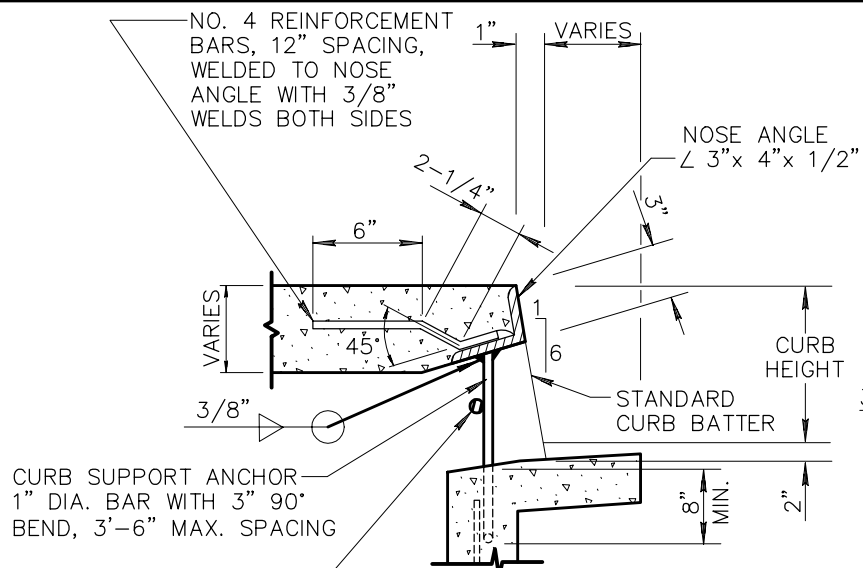
STANDARD DETAIL
ENGLISH

CATCH BASIN TYPE 'F'
(FOR USE WITHOUT CURB)

REVISED

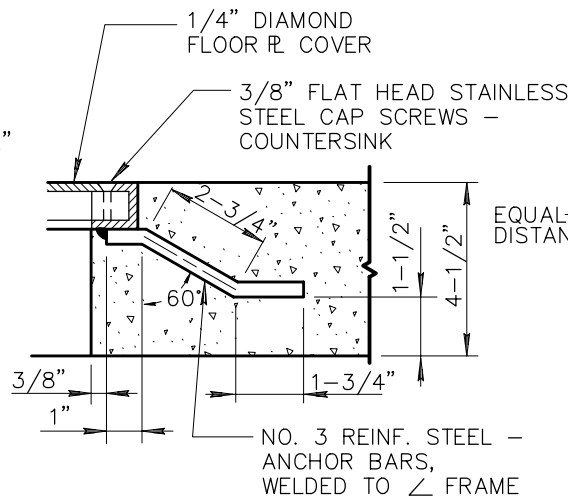
DETAIL NO.

535

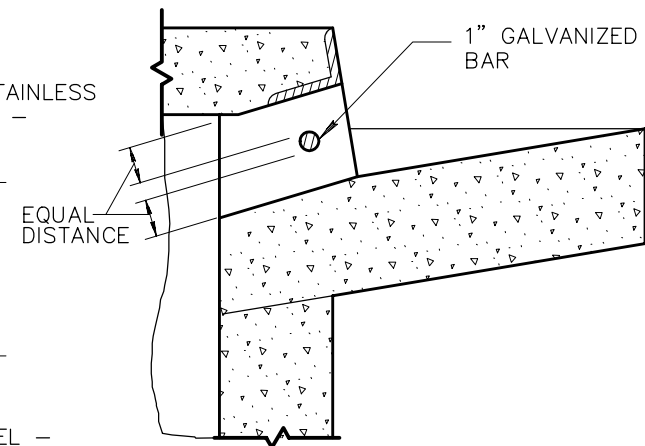


SECTION C-C

FOR DETAILS 531, 532 AND 533



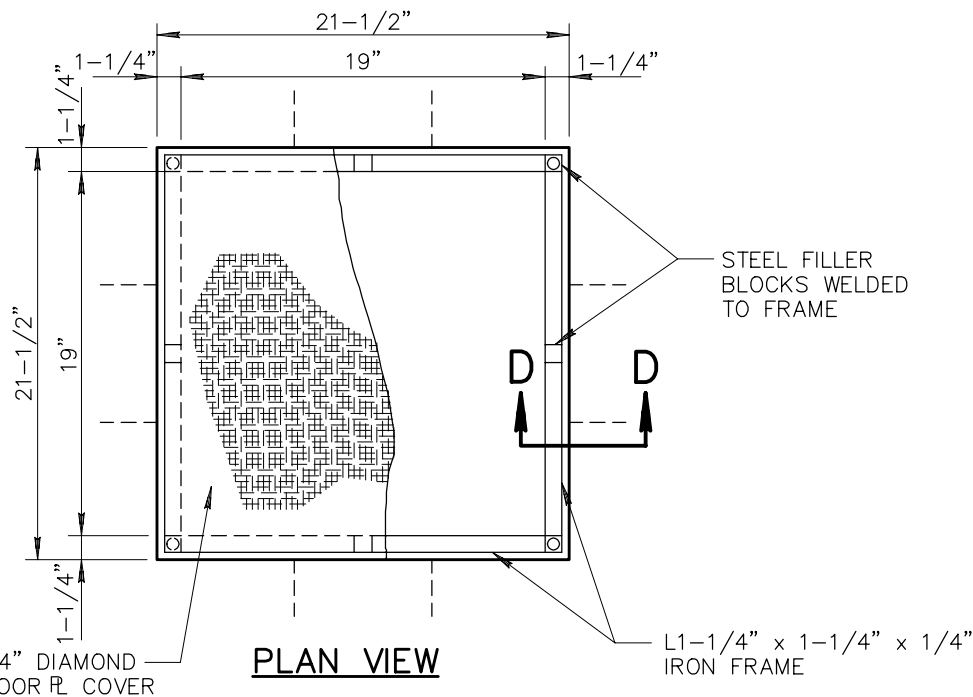
SECTION D-D



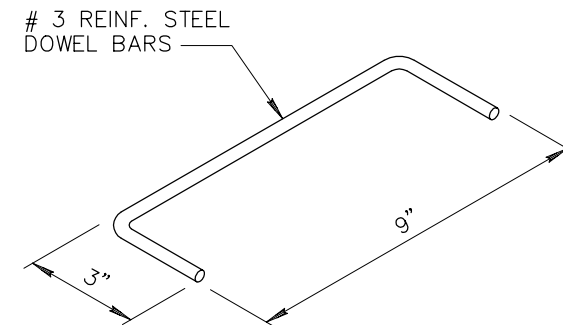
PROTECTION BAR

NOTES:

- 1) HORIZONTAL PLAIN ROUND GALVANIZED STEEL PROTECTION BAR SHALL BE USED WHEN CURB FACE IS 9" OR MORE.
- 2) THE BAR SHALL BE EMBEDDED 5" AT EACH END.



PLAN VIEW



DOWEL BAR

DETAIL NO.

536-1



STANDARD DETAIL
ENGLISH

COMMON DETAILS AND SECTIONS
FOR CURB OPENING CATCH BASINS

REVISED

DETAIL NO.

536-1



6"

1-3/16"

4"

1/2" DIA.
STAINLESS STEEL
BAR STOCK

2-1/4"

CO
(CL

1 EACH 304-S.STL. SPRING
2-1/2" x 17/32" I.C. x 3/32"

2 EACH 1/2" HEX NUT

3 EACH 1/2" FLAT WASHER

1 EACH 1/2" LOCK WASHER

TEEL

SIDEWALK SLAB
FOR CATCH
BASIN

CONCRETE FILLER
(CLASS B)

1/8"

1/2"

1"

1/2"

3/8"

2-1/4"

1/2"

24" DIA.

1-1/8"

2"

1/2"

2-3/4"

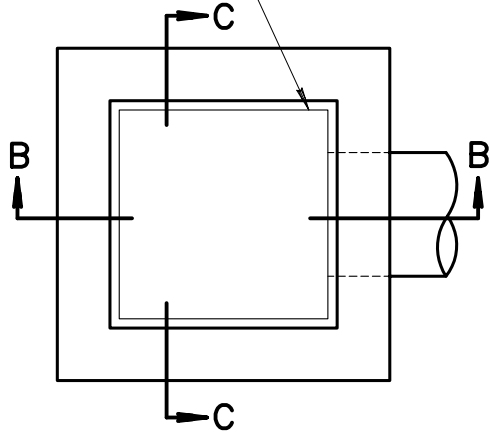
6"

Technical drawing of a window frame assembly. The drawing shows a cross-section of the frame with various dimensions and labels. The overall width is 25-3/4". The depth of the frame is 7/8". The frame is composed of a 1/4" thick outer frame and a 1/4" thick inner frame. The frame is mounted on a 24" DIA base. The frame is secured with a 28" DIA bolt. The frame is labeled with dimensions: 25-3/4", 5/8", 2-1/2", 1/4", 7/8", 1/4", 24" DIA, and 28" DIA. The frame is also labeled with the word "COVER" and "FRAME".

NOTES:

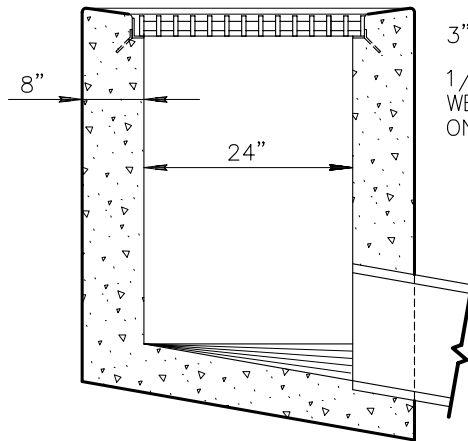
1. FRAME SHALL BE NON-LOCKING.
2. FRAME AND COVER SHALL BE CAST IRON OR ASTM A-36 STRL. HORIZONTAL SURFACE OF COVER IN CONTACT WITH FRAME SHALL BE MACHINED. ASA B-46 ROUGHNESS SHALL NOT EXCEED 1/32".
3. COVER SHALL BE FILLED WITH CONCRETE AND BROOM FINISHED.
4. SMALL VARIATIONS IN DIMENSIONS OF FEATURES OF A MINOR NATURE THAT ARE PART OF THE FOUNDRY'S CASTING ARE PERMISSIBLE.

29" x 29" I.D.
GRATE FRAME



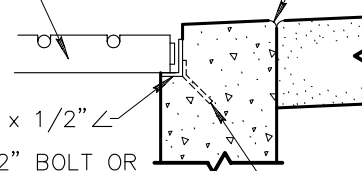
PLAN

SINGLE GRATE



SECTION B-B

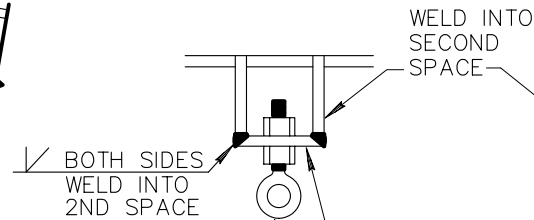
GRATE 1/2" R



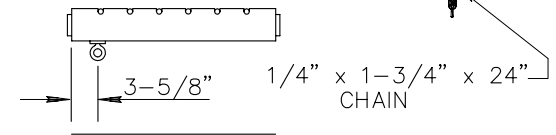
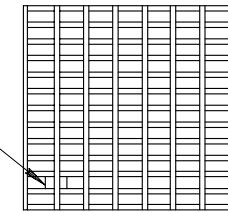
3" x 2-1/2" x 1/2" \angle
1/2" x 3-1/2" BOLT OR
WELDED LUG, 4 EACH -
ONE ON EACH CORNER

DETAIL OF ANGLE FRAME
GRATE SUPPORT

ALL CONCRETE SHALL BE
CLASS 'A' PER SECT. 725.
EXPOSED EDGES SHALL BE
FINISHED WITH A 1/2"
RADIUS.

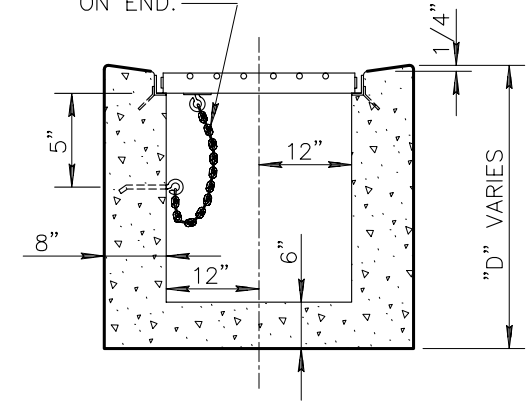


1/2" DIA x 1" EYE BOLT
2-3/8" x 3-1/8" x 1/4"
BEVELED SIDES FOR WELDS



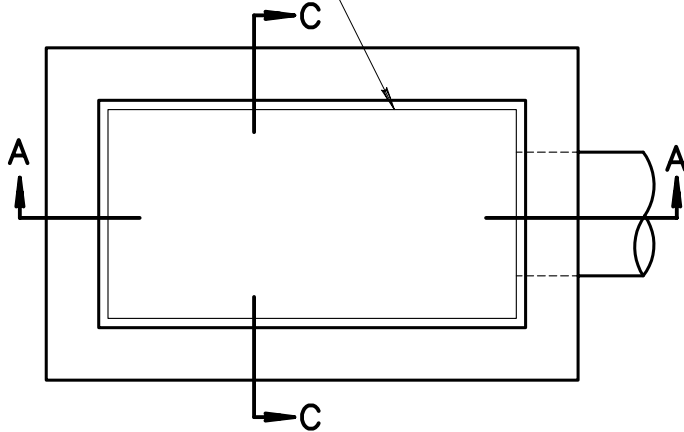
BAR GRATE
SEE DETAIL 539

1/4" x 1-3/4" x 24" CHAIN TO 1" x 6"
EYE BOLT IN WALL. BEND BOLT 1"
ON END.



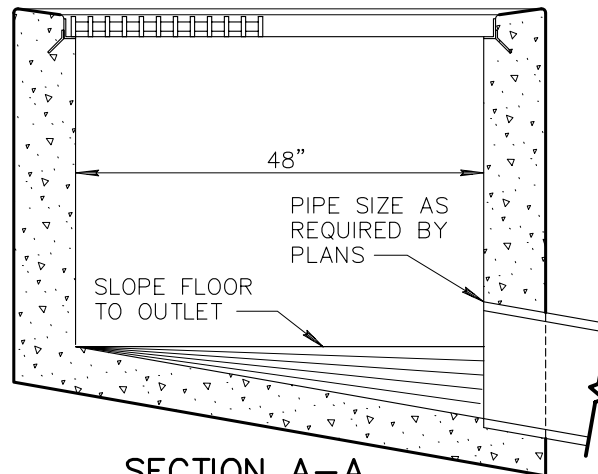
SECTION C-C

29" x 53" I.D.
GRATE FRAME



PLAN

DOUBLE GRATE



SECTION A-A

DETAIL NO.

537



STANDARD DETAIL
ENGLISH

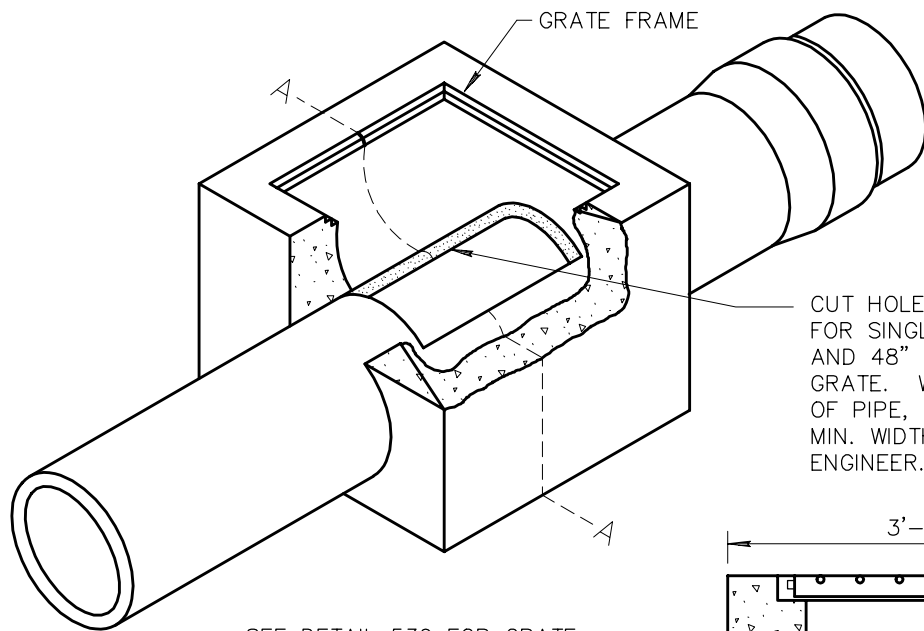
CATCH BASIN - TYPE 'G'

REVISED

01-03-2002

DETAIL NO.

537



GRATE FRAME

WHEN DOUBLE GRATE IS USED
INCREASE THE LENGTH OF THE
STRUCTURE ACCORDINGLY.

CUT HOLE IN PIPE 24" LONG
FOR SINGLE GRATE STRUCTURES
AND 48" LONG FOR DOUBLE
GRATE. WIDTH DEPENDS ON DIA.
OF PIPE, NOT TO EXCEED 22"
MIN. WIDTH TO BE SET BY PROJECT
ENGINEER.

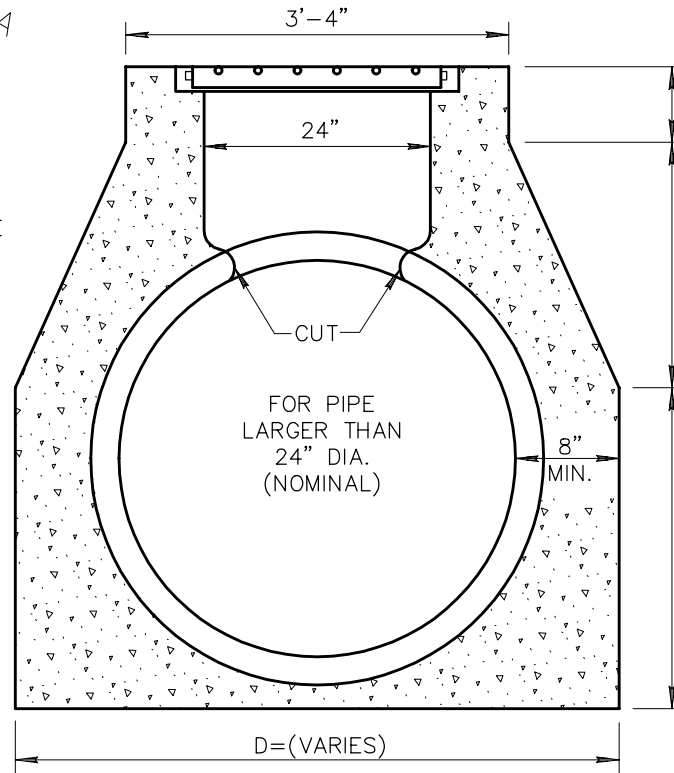
SEE DETAIL 539 FOR GRATE

29" x 29" I.D. SINGLE FRAME
29" x 53" I.D. DOUBLE FRAME

3" x 2-1/2" x
1/2" ANGLE
IRON FRAME

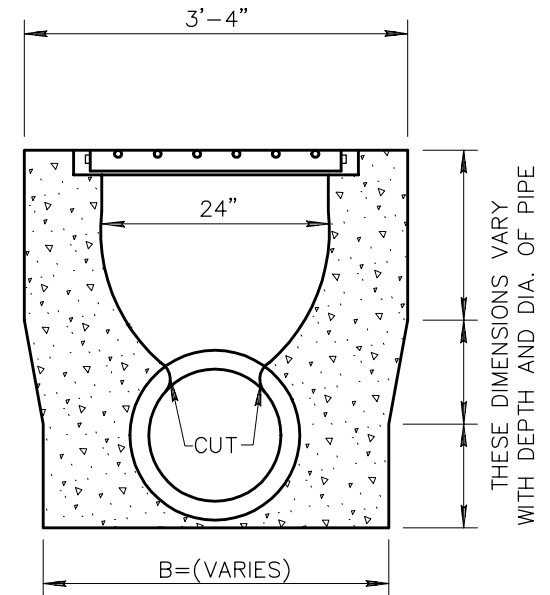
1/2" DIA x 6"
LUGS WELDED
TO FRAME, 4
EACH - 1 ON
EACH CORNER
OF FRAME

**DETAIL OF ANGLE
FRAME GRATE SUPPORT**



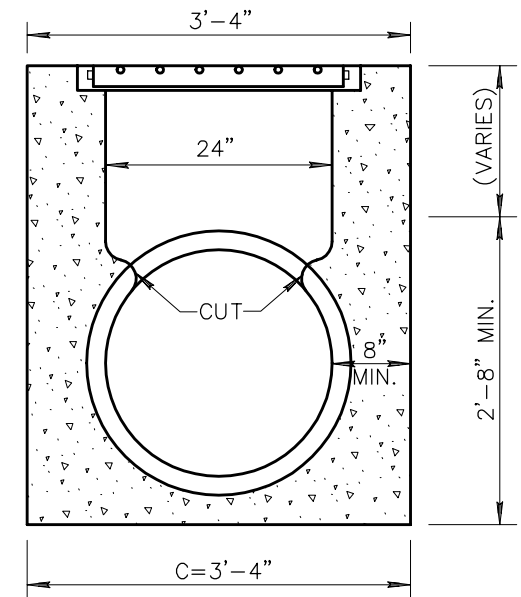
SECTION A-A

THESE DIMENSIONS VARY
WITH DEPTH AND DIA. OF PIPE



SECTION A-A

THESE DIMENSIONS VARY
WITH DEPTH AND DIA. OF PIPE



**SECTION A-A
24" PIPE (NOMINAL)**

DETAIL NO.

538



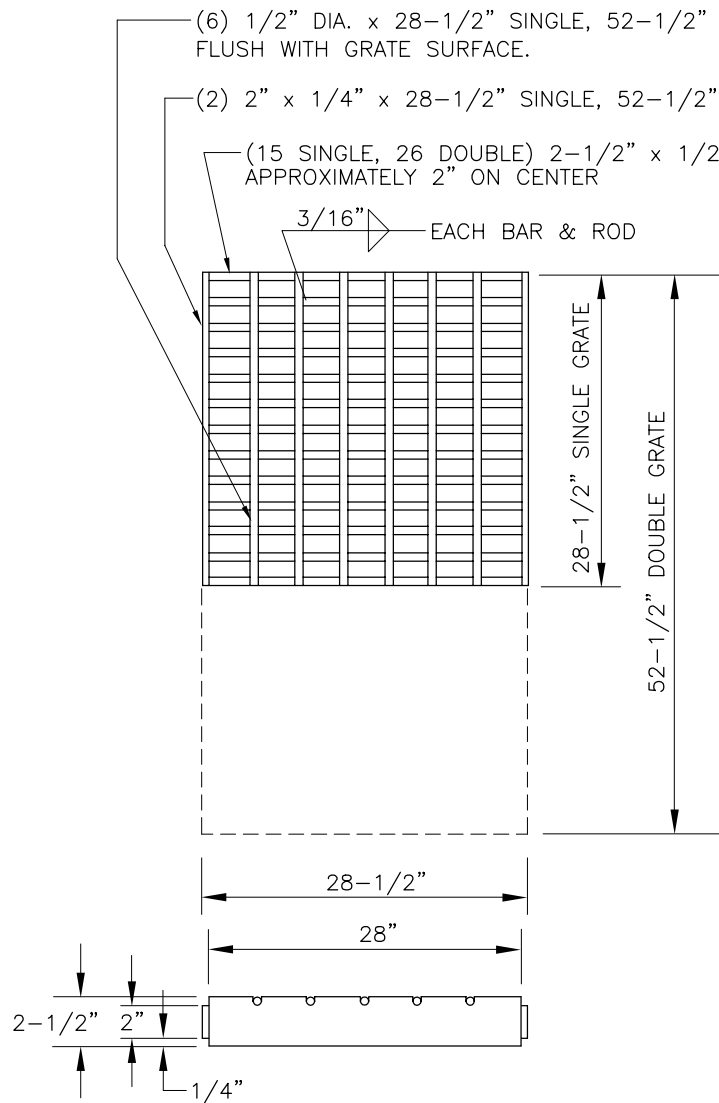
STANDARD DETAIL
ENGLISH

CATCH BASIN - TYPE 'H'

REVISIONS

DETAIL NO.

538



NOTES:

1. ALL STEEL SHALL BE IN ACCORDANCE WITH A.S.T.M. A-36.
2. WELDING SHALL BE IN ACCORDANCE WITH A.W.S. SPECIFICATIONS.
3. FRAME AND GRATE SHALL BE TESTED FOR ACCURACY OF FIT AND SHALL BE MARKED IN SETS BEFORE DELIVERY.
4. THE COMPLETED ASSEMBLY SHALL BE GIVEN ONE SHOP COAT OF NO. 1 PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECTION 790.
5. THE GRATE SHALL BE FABRICATED TO WITHIN 1/8" SPECIFIED DIMENSIONS.

DETAIL NO.

539



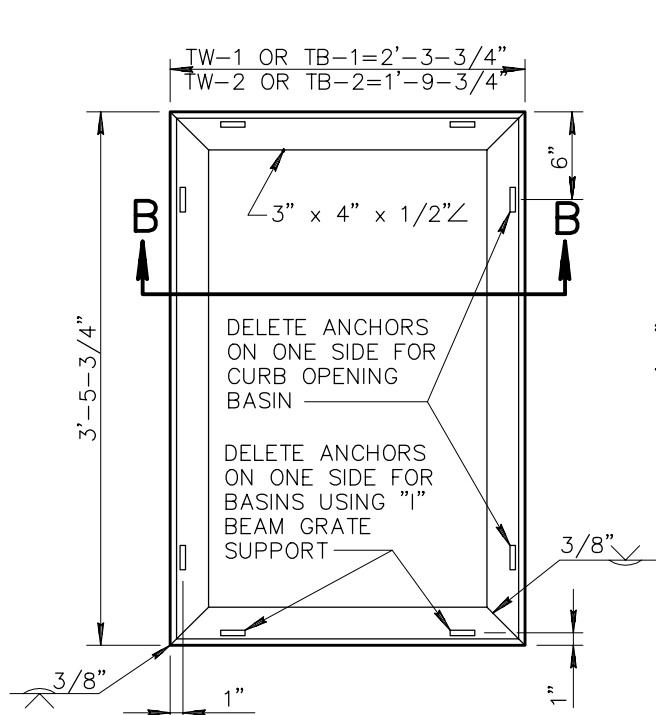
STANDARD DETAIL
ENGLISH

GRATES FOR CATCH BASINS,
TYPE G AND H

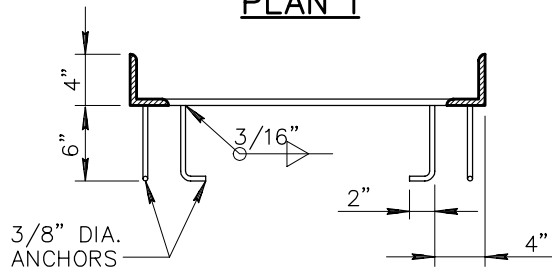
REVISED

DETAIL NO.

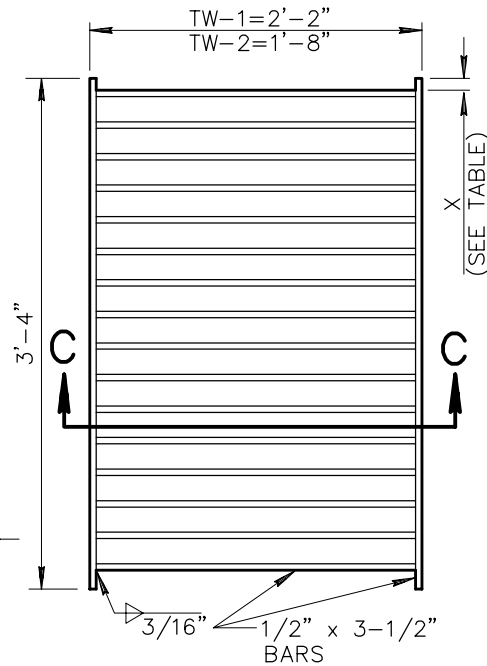
539



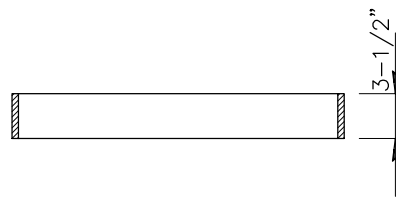
PLAN I



SECTION B-B

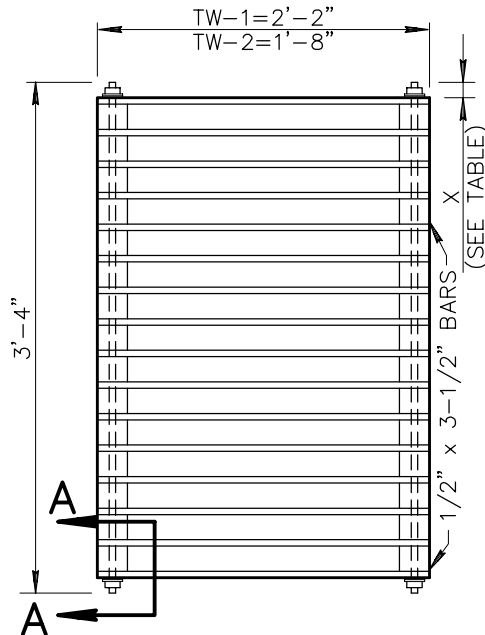


PLAN IA

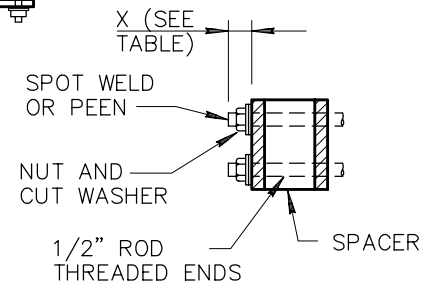
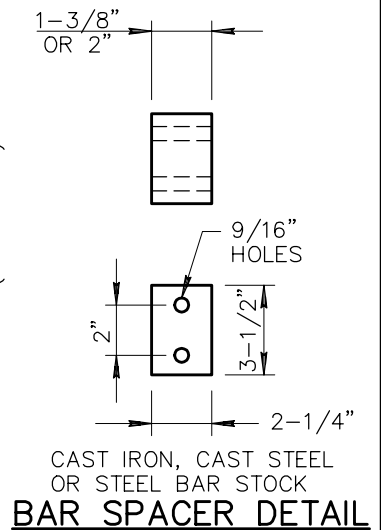


SECTION C-C

GRATE TYPES TW-1 AND TW-2



PLAN IB



SECTION A-A

GRATE TYPES TB-1 AND TB-2

NOTES:

1. GRATING UNITS AND FRAMES SHALL BE FABRICATED FROM STRUCTURAL STEEL EXCEPT AS NOTED.
2. WELDING SHALL BE IN ACCORDANCE WITH STD. WELDING SPECS.
3. THE COMPLETED ASSEMBLY SHALL BE GIVEN TWO SHOP COATS OF NO. 1 PAINT AS PER SECT. 790.
4. FRAME AND GRATE SHALL FIT TO A MAX. ROCK OF 0.093" AT ANY POINT.
5. RESTRICT USE TO GRADES OF 3% OR LESS.

BAR TABLE

TYPE	CLEAR SPACING	NO. BARS	X	GRATE OPENING ft ²
TW OR TB-1.0	1"	26	1"	3.21
TW OR TB-1.1	1-3/8"	21	1"	3.32
TW OR TB-1.2	2"	16	1"	4.66
TW OR TB-2.0	1"	26	1"	2.32
TW OR TB-2.1	1-3/8"	21	1"	2.41
TW OR TB-2.2	2"	16	1"	2.65

TW INDICATES TRANSVERSE WELDED
TB INDICATES TRANSVERSE BOLTED

DETAIL NO.

540-1



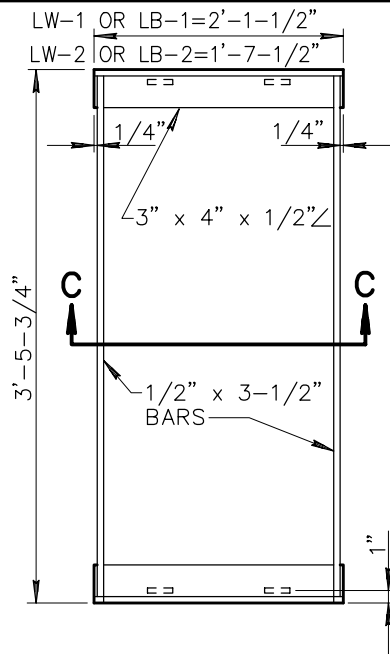
STANDARD DETAIL
ENGLISH

CATCH BASIN GRATES

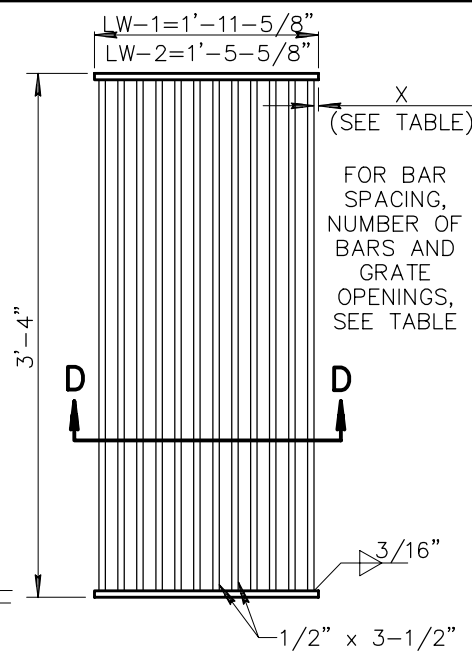
REVISED

DETAIL NO.

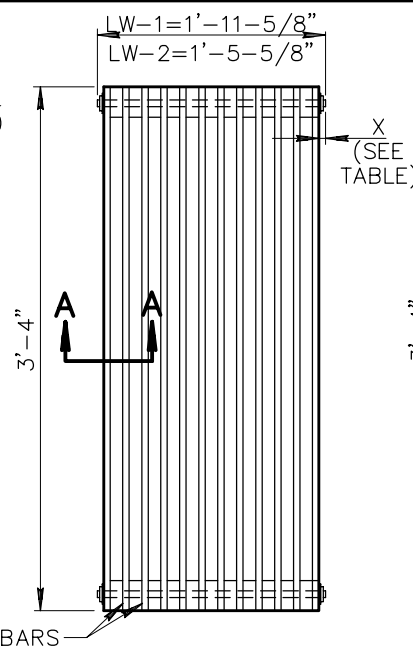
540-1



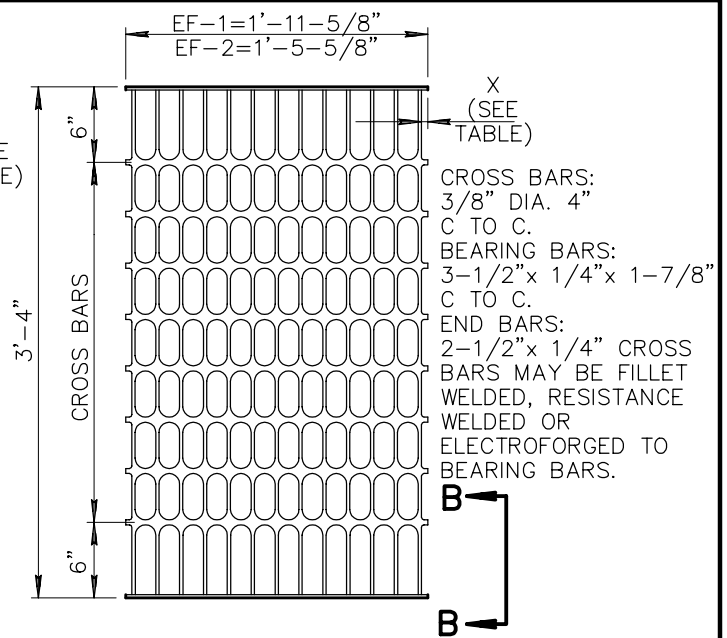
PLAN II



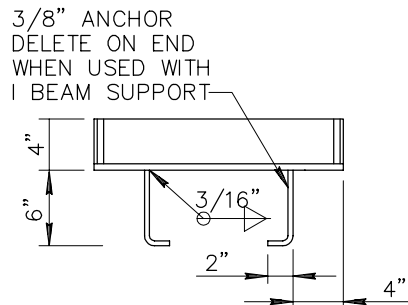
PLAN IIA



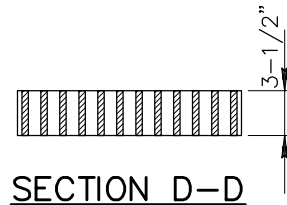
PLAN IIB



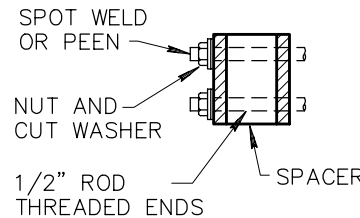
PLAN II



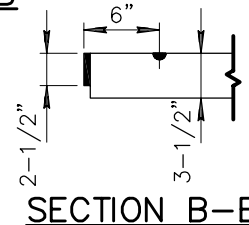
SECTION C-C



SECTION D-D

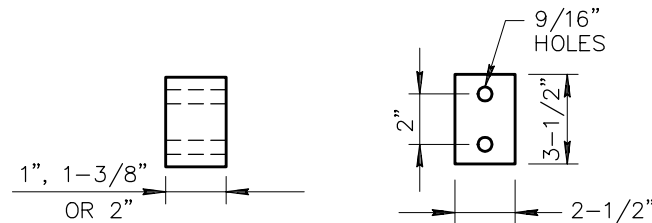


SECTION A-A



SECTION B-B

GRATE TYPE	CLEAR BAR SPACING	NO. BARS	X	GRATE OPENING ft ²
LW OR LB-1.0	1"	16	5/16"	3.97
LW OR LB-1.1	1-3/8"	13	5/16"	4.34
LW OR LB-1.2	2"	9	1-9/16"	4.84
EF-1	1-5/8"	13	7/16"	4.66
LW OR LB-2.0	1"	12	5/16"	2.98
LW OR LB-2.1	1-3/8"	9	1-1/16"	3.35
LW OR LB-2.2	2"	7	1-1/16"	3.60
EF-2	1-5/16"	10	1/4"	3.48



BAR SPACER DETAIL

CAST IRON, CAST STEEL
OR STEEL BAR STOCK

NOTES:

1. LW INDICATES LONGITUDINAL WELDED.
2. LB INDICATES LONGITUDINAL BOLTED.
3. EF INDICATES ELECTROFORGED.
4. GRATING UNITS AND FRAMES SHALL BE FABRICATED FROM STRUCTURAL STEEL 'A-36 EXCEPT AS NOTED.
5. ALL WELDING SHALL BE IN ACCORDANCE WITH STANDARD WELDING SPECIFICATIONS.
6. THE COMPLETED ASSEMBLY SHALL BE GIVEN ONE SHOP COAT OF NO. 1 PAINT.
7. FRAMES AND GRATES SHALL FIT TO A MAXIMUM ROCK OF 0.093" AT ANY POINT.
8. GRATE TYPE LW AND EF RESTRICTED TO SLOPES OF 3% OR LESS
9. GRATES TYPE LB USE LONGITUDINAL GRADES IN EXCESS OF 3% OR AS AN ALTERNATE TO TYPES LW OR EF ON GRADES OF 3% OR LESS.

DETAIL NO.

540-2



STANDARD DETAIL
ENGLISH

CATCH BASIN GRATES

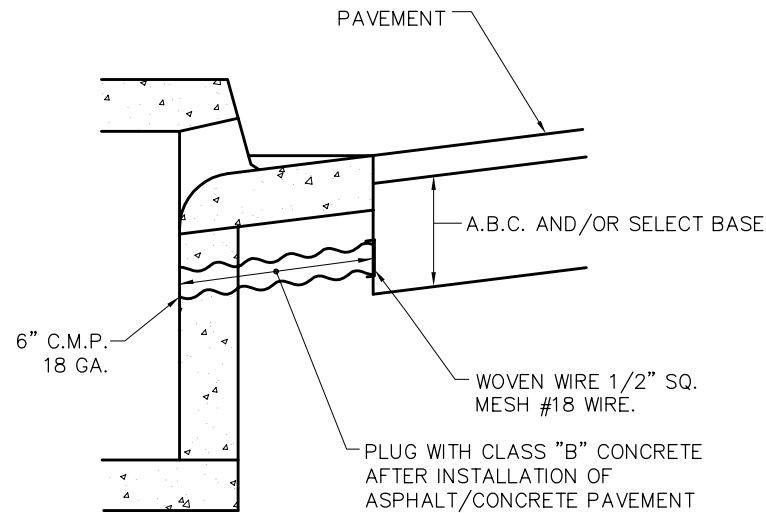
REVISED

DETAIL NO.

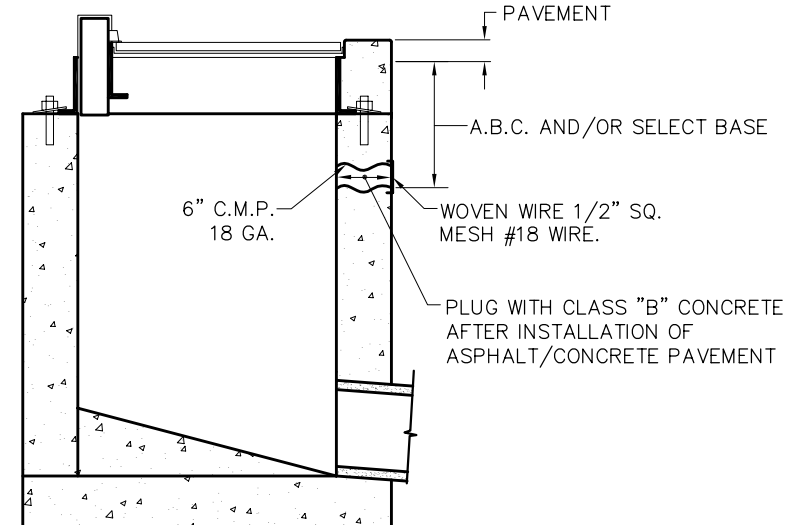
540-2

NOTES:

1. INSTALL WHEN REQUIRED BY PLANS, SPECIFICATIONS, OR APPROVED BY THE ENGINEER.
2. SEE PROJECT PLANS FOR CATCH BASIN DETAILS AND PAVEMENT STRUCTURAL SECTION.



CURB OPENING INLET



GRATE OPENING INLET

DETAIL NO.

541



**STANDARD DETAIL
ENGLISH**

CATCH BASIN SUBGRADE DRAIN

REVISED

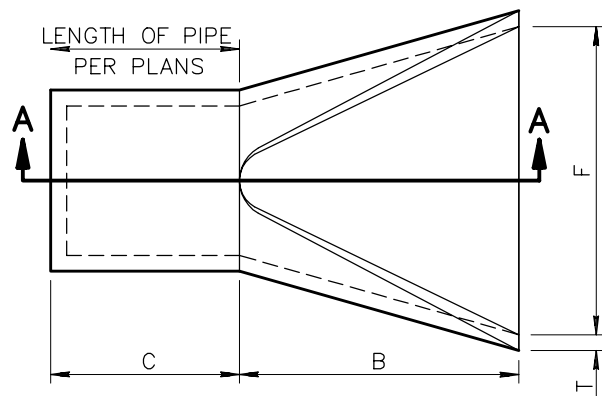
01-01-2005

DETAIL NO.

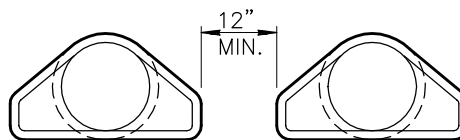
541

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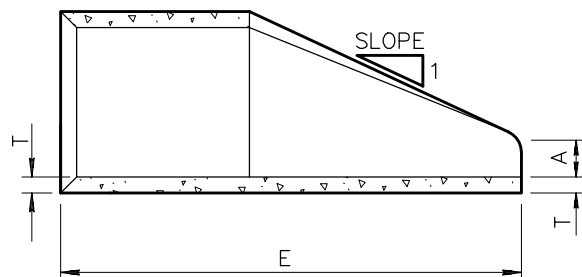
PIPE DIA.	APPROX. WEIGHT (LBS.)	DIMENSIONS – INCHES						APPROX. SLOPE
		T	A	B	C	E	F	
24"	1520	3	9-1/2	43-1/2	30	73-1/2	48	3
27"	1930	3-1/4	10-1/2	49-1/2	24	73-1/2	54	3
30"	2190	3-1/2	12	54	19-3/4	73-3/4	60	3
36"	4100	4	15	63	34-3/4	97-3/4	72	3
42"	5380	4-1/2	21	63	35	98	78	3
48"	6550	5	24	72	26	98	84	3
54"	8240	5-1/2	27	65	33-1/4	98-1/4"	90	2 1/2



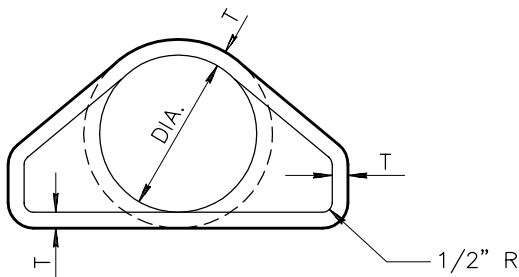
PLAN



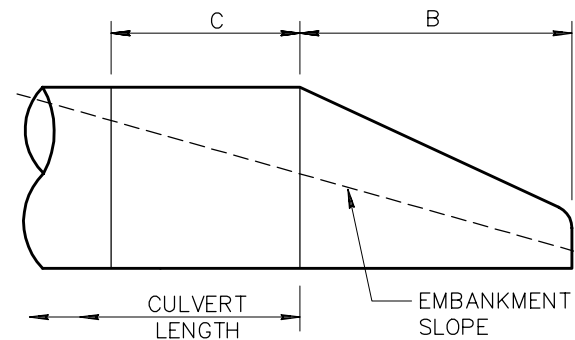
SPACING FOR MULTIPLE INSTALLATION



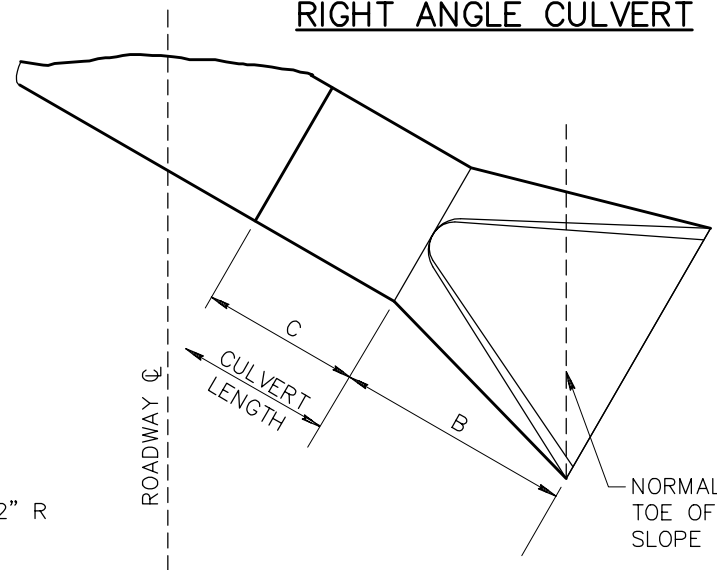
SECTION A-A



FRONT ELEVATION



RIGHT ANGLE CULVERT



SKEWED CULVERT

NOTES

1. DESIGN OF END SECTION SHALL CONFORM TO STANDARD FOR REINFORCED CONCRETE PIPE.
2. END SECTION JOINT CONFORMATION SHALL MATCH THE PIPE JOINTS.
3. EMBANKMENT SLOPE SHALL BE WARPED TO MATCH SLOPE OF END SECTION.
4. CULVERT LENGTH IS AS SHOWN ON PLANS.

DETAIL NO.

545



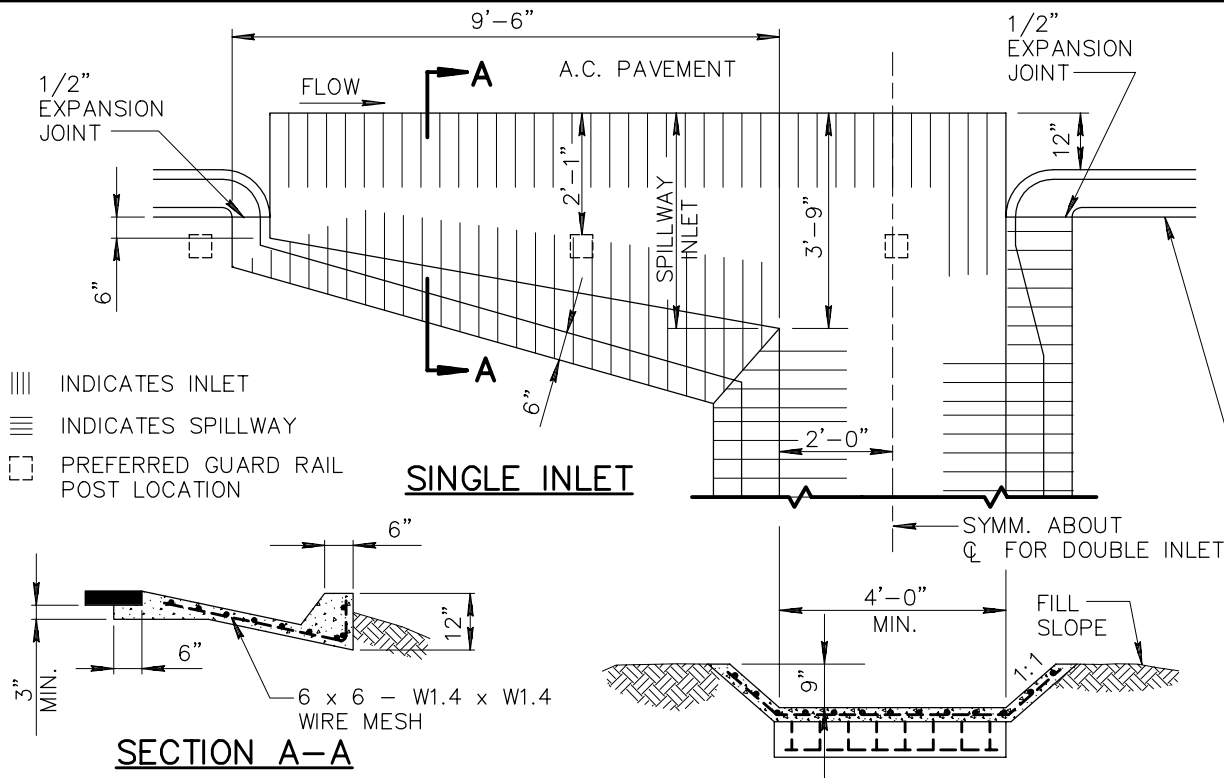
STANDARD DETAIL
ENGLISH

END SECTION—REINFORCED CONCRETE PIPE

REVISED

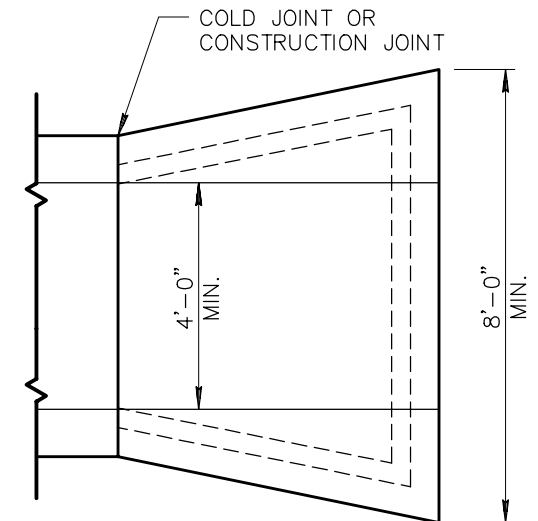
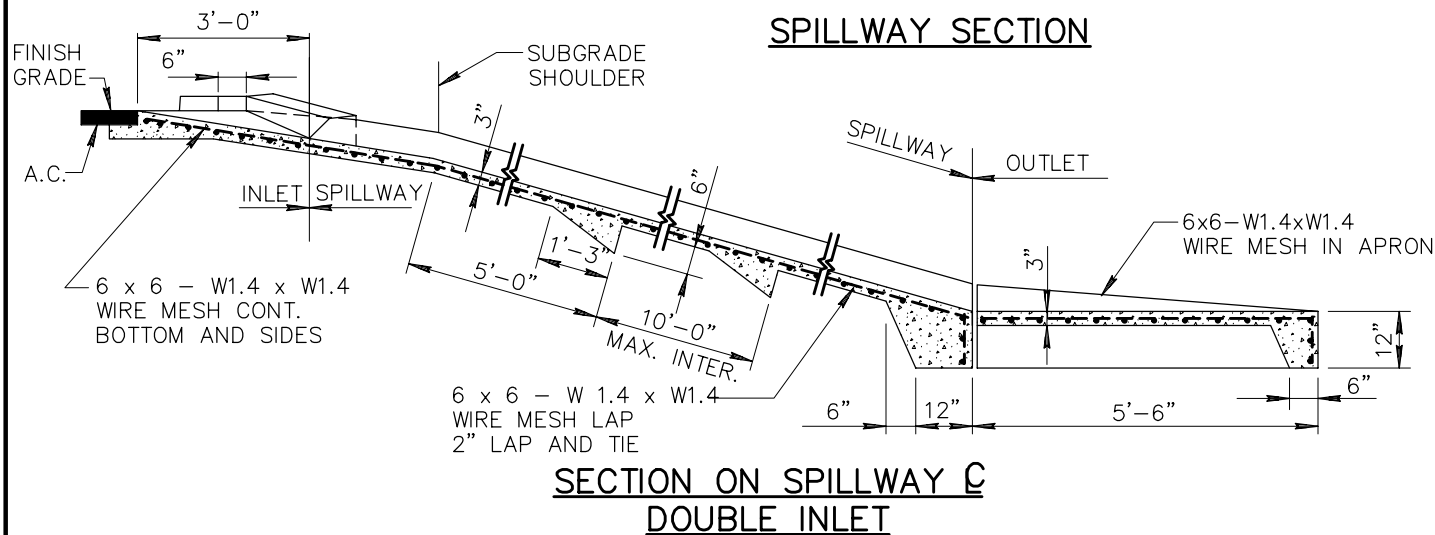
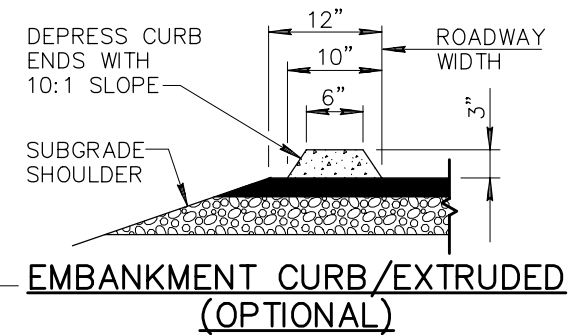
DETAIL NO.

545



NOTES:

1. WHERE ROCK IS ENCOUNTERED THE OUTLET MAY BE OMITTED.
2. ALL PORTIONS OF SPILLWAY TO BE TROWEL FINISHED.
3. CONCRETE FOR THE SPILLWAY INLET, SPILLWAY AND OUTLET SHALL BE CLASS 'B' PER SECT. 725.
4. WHEN THE OUTLET IS USED, THE WIRE MESH SHALL EXTEND THROUGH THE JOINT INTO THE OUTLET IN LIEU OF BENDING INTO THE KEY.



DETAIL NO.

550



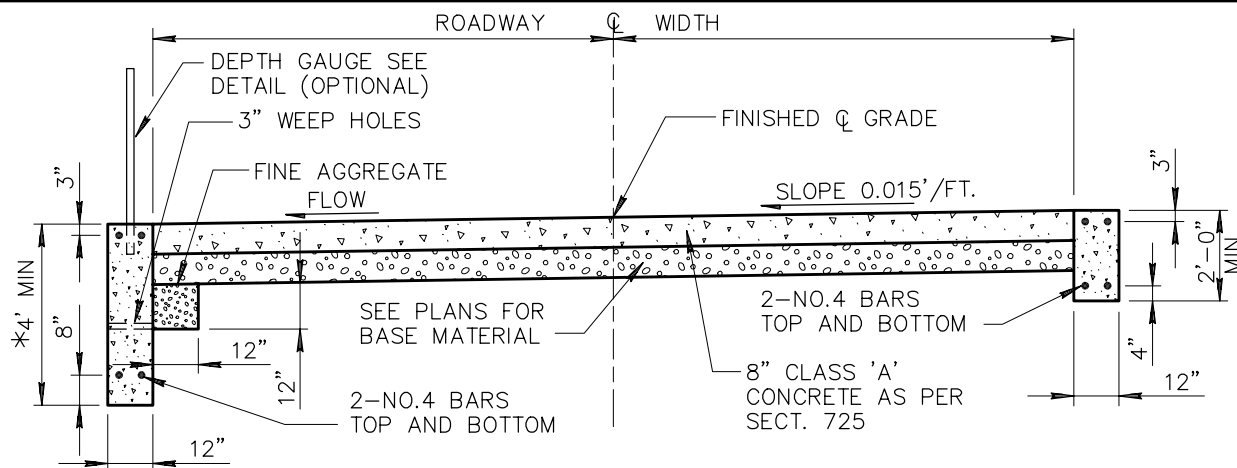
STANDARD DETAIL
ENGLISH

SPILLWAY INLET AND OUTLET

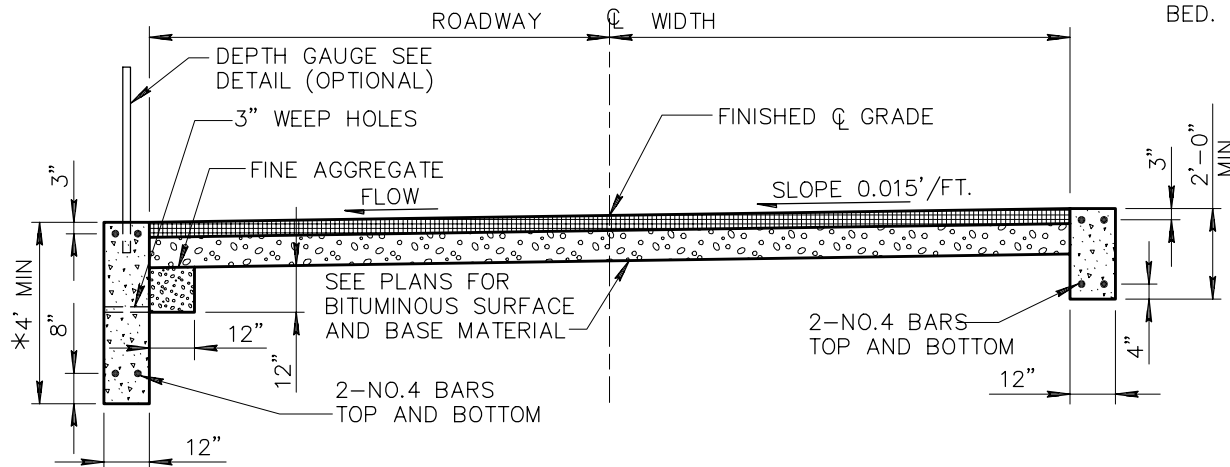
REVISED

DETAIL NO.

550



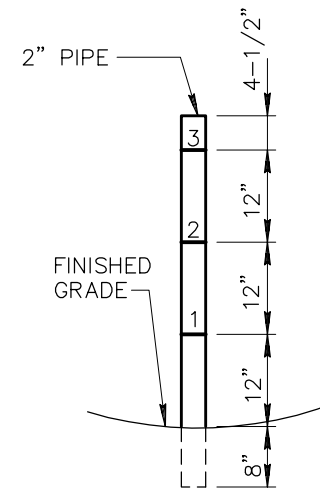
CONCRETE SURFACE FORD CONCRETE WALLS



BITUMINOUS SURFACE FORD CONCRETE WALLS

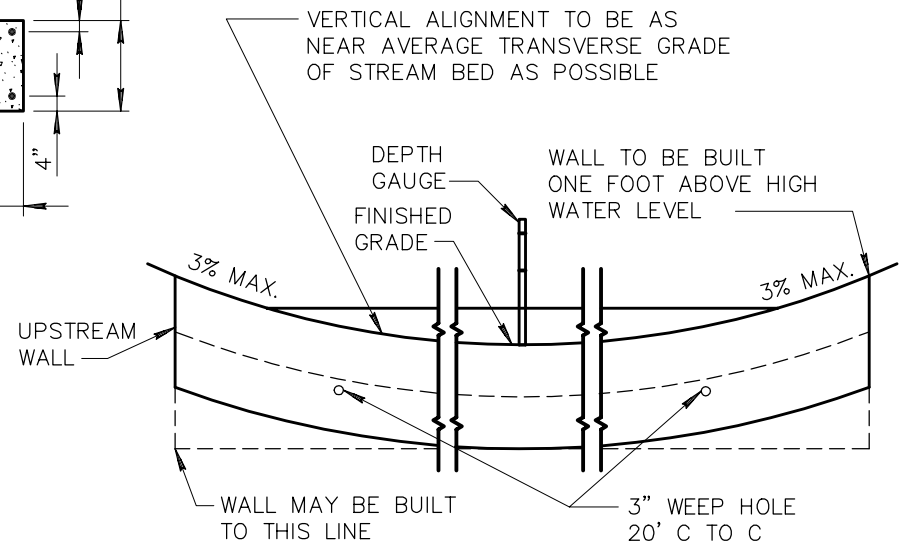
NOTES:

1. FORD WALLS SHALL BE CLASS 'A' CONCRETE PER SECT. 725
2. DEPTH GAUGE SHALL BE PAINTED 2 COATS WHITE ENAMEL. NUMERALS AND MARKERS SHALL BE 1 COAT BLACK ENAMEL.
3. NUMBERS ON DEPTH GAUGE TO BE 2" HIGH.
4. HEIGHT OF DEPTH GAUGE OPTIONAL.
5. TWO DEPTH GAUGES MAY BE USED. ONE ON EACH END OF UPSTREAM WALL. START WITH 2' INSTEAD OF 1'



DEPTH GAUGE DETAIL
(OPTION OF THE CONTRACTING AGENCY)

*MIN. DISTANCE
BELOW STREAM
BED.



ELEVATION LOOKING UPSTREAM

DETAIL NO.

552



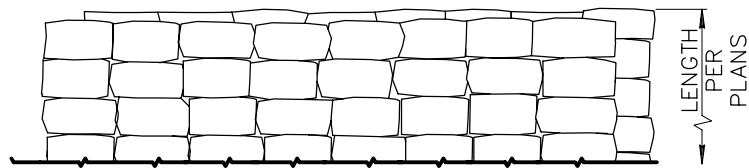
STANDARD DETAIL
ENGLISH

CONCRETE CUT-OFF WALLS

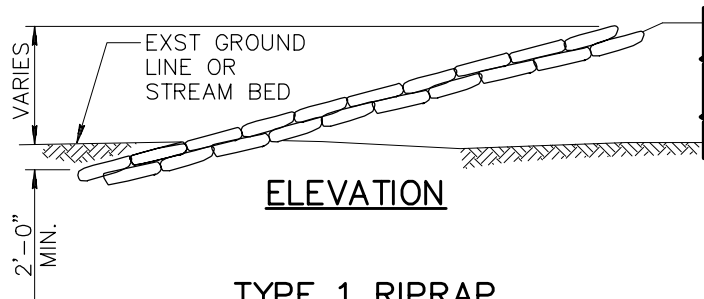
REVISED

DETAIL NO.

552

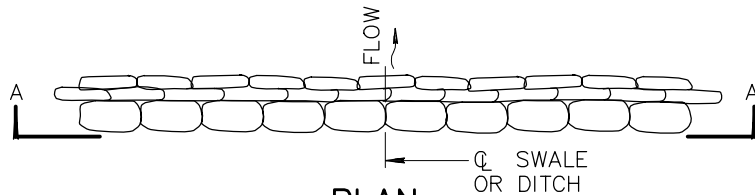


PLAN

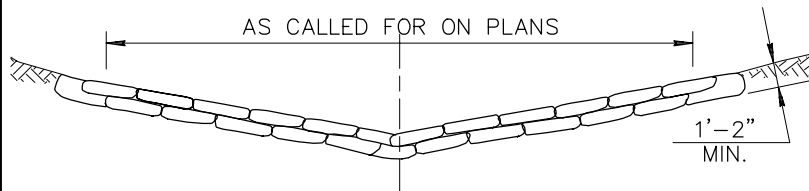


ELEVATION

TYPE 1 RIPRAP



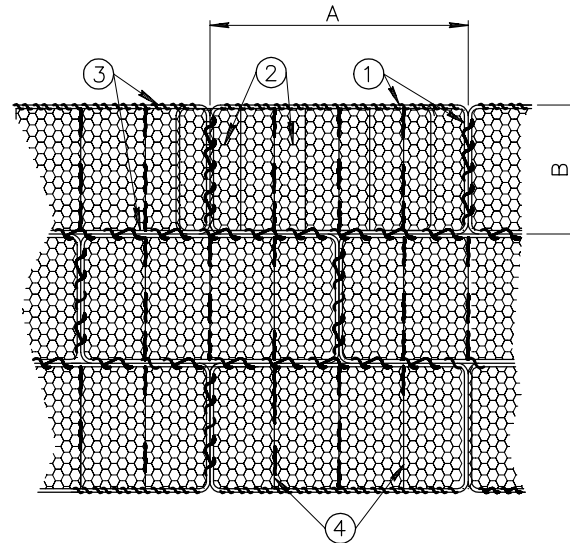
PLAN



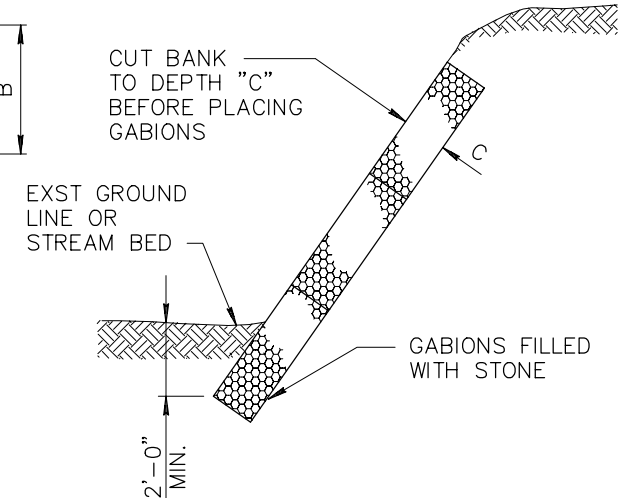
ELEVATION

TYPE 2 RIPRAP

TYPICAL GABIONS



PLAN



ELEVATION

- ① HEAVY GAUGE FRAME WIRE.
- ② HEAVY GAUGE TRIPLE-TWIST HEXAGONAL MESH (OR EQUAL) FASTENED TO FRAME WIRE.
- ③ CONTINUOUS HEAVY GAUGE WRAPPED AROUND FRAMES TO FASTEN GABIONS TO EACH OTHER.
- ④ PARTITIONS TO PREVENT SHIFTING, NORMALLY ONE PER 3' LENGTH. INSTALLED AT FACTORY.

NOMINAL SIZE COMBINATIONS				
LENGTH	WIDTH	DEPTH		
A	B	C		
6'	3'	1',	1.5'	3'
9'	3'	1',	1.5'	3'
12'	3'	1',	1.5'	3'

OTHER SIZES AVAILABLE FROM MANUFACTURER.

NOTES:

- 1. PLAIN ROCK OR GROUTED ROCK MAY BE SUBSTITUTED FOR SACKED CONCRETE.
- 2. GROUT FOR RIPRAP MAY BE PNEUMATICALLY PLACED MORTAR.

DETAIL NO.

555



STANDARD DETAIL
ENGLISH

EROSION PROTECTION / RIPRAP

REVISED

DETAIL NO.

555